

THE IRON AGE .. January 21, 1932

J. H. VAN DEVENTER
Editor
F. J. WINTERS
E. F. CONE
G. EHRNSTROM, JR.

W. S. MACON
Consulting Editor
R. E. MILLER
F. L. PRENTISS
Cleveland

A. I. FINDLEY
Editor Emeritus
R. A. FISKE
Chicago
T. H. GERKEN
Pittsburgh

G. L. LACHER
Managing Editor
BURNHAM FINNEY
Detroit
L. W. MOFFETT
Washington

C. E. WRIGHT
Markets and News Editor
GERARD FRAZER
Boston
R. G. MCINTOSH
Cincinnati

CONTENTS

What About 1932 Profits?	217
Connecting Rod Machining and Inspection	221
Heating Stock for Nuts and Rivets	222
Welded Bomb Bodies	225
Crane Motorization and Control	226
Making Large Bells for a Carillon	230
Preventing White Rust on Zinc Coatings	232
Pipe Line Welding	235
Symposium on Steel Melting Methods	236

▲ ▲ ▲

New Equipment	239
News	244
Automotive Industry	249
Personals and Obituaries	253
Editorials	255
Markets	257
Construction and Equipment Buying	274

▲ ▲ ▲

Products Advertised	(Advertising Section)	64
Index to Advertisers	(Advertising Section)	82

▲ ▲ ▲

THE IRON AGE PUBLISHING COMPANY, 239 WEST 39th ST., NEW YORK

Division of United Business Publishers, Inc.

F. J. FRANK, *President*

G. H. GRIFFITHS, *Secretary*

C. S. BAUR, *General Advertising Manager*

Copyright, 1932, by
IRON AGE PUBLISHING CO.
Member, Audit Bureau of Circulations
Member, Associated Business Papers

Published every Thursday. Subscription Price:
United States and Possessions, Mexico, Cuba, \$6.00;
Canada, \$8.50, including duty; Foreign, \$12.00 a
year. Single Copy 25 Cents.

Cable Address: "Ironage, N. Y."

ADVERTISING STAFF

Emerson Findley, 1362 Hanna Bldg., Cleveland.
B. L. Herman, 847 Ellicott Sq. Bldg., Buffalo, N. Y.
H. K. Hottenstein, 1507 Otis Bldg., Chicago
Pelree Lewis, 7338 Woodward Ave., Detroit, and
402 Traction Bldg., Cincinnati.
Charles Lundberg, 45 Kent Rd., Upper Darby,
Del. Co., Pa.
C. H. Ober, 239 West 39th St., New York.
W. B. Robinson, 1319 Park Bldg., Pittsburgh.
W. C. Sweetser, 239 West 39th St., New York.
D. C. Warren, P. O. Box 81, Hartford, Conn.

SEVENTY-SEVENTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

A replacement plan that paid big dividends

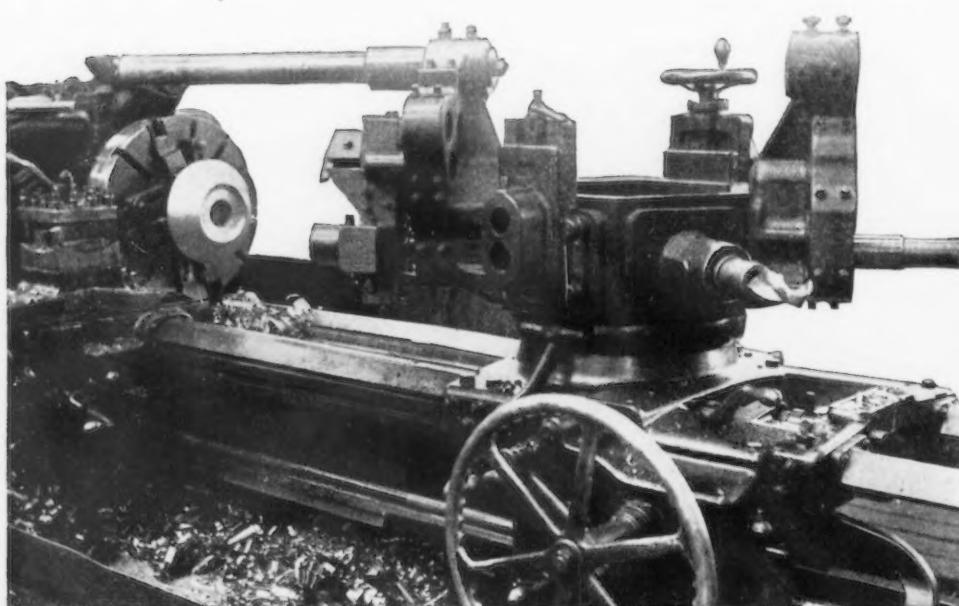
The Pittsburgh Gear and Machine Company were using machines over ten years old. The question had been raised: How much could be saved by replacing them?

Warner & Swasey engineers were called in . . . the work was studied carefully and the estimates showed that a time saving of 20% was possible. The old machines were replaced with eleven new Warner & Swasey turret lathes . . . and the result was an actual average time saving of 25%.

*You can obtain
similar savings in your shop!*

Ask a Warner & Swasey engineer to look over your work. He will show you what can be done to lower your costs. This service is free . . . just call the nearest W & S representative.

The Warner & Swasey Co.
Cleveland, Ohio, U. S. A.



One of the W & S machines at the Pittsburgh Gear & Machine Company

THE IRON AGE

ESTABLISHED 1855

NEW YORK, JANUARY 21, 1932

VOL. 129, No. 3

WHAT ABOUT 1932 PROFITS?—THE ANSWER IS REDUCTION OF COSTS



By C. E. KNOEPPEL
Industrial Counsel, Cleveland



ASSUMING that volume of business for most companies will not be much higher in 1932 than in 1931 and that selling prices of most articles will be little, if any, higher, the question of possible profits in the new year becomes of paramount importance if some business concerns are to survive. After two years of diminishing profits or actual losses, attention will be focused on increasing sales volume as well as decreasing costs. In budgeting for 1932, the author uses a chart based on percentage rather than dollars, in order more strikingly to illustrate the pernicious influence of fixed costs on profits.

FOR most manufacturers 1931 was a hectic year, characterized by reduced sales volume and "red ink."

Many companies are looking to 1932 with misgivings—partly because it is not known with any degree of certainty whether continued depre-

ssion or recovery is ahead; partly because of "pernicious economic anemia" abroad; and partly because 1932 is a Presidential election year.

The new year will severely test the managements of most of our industrial concerns because, unless ways and means can be found to better their

profits, many companies which were in difficulties in 1930 and 1931 will find their way to the "industrial scrap pile," due to sheer inability to withstand further losses.

It is therefore imperative that more attention than ever before be devoted to the vital matter of profit-

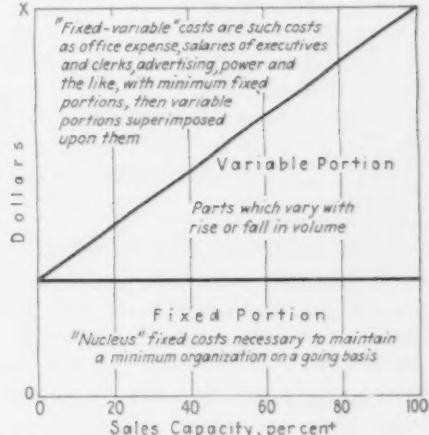
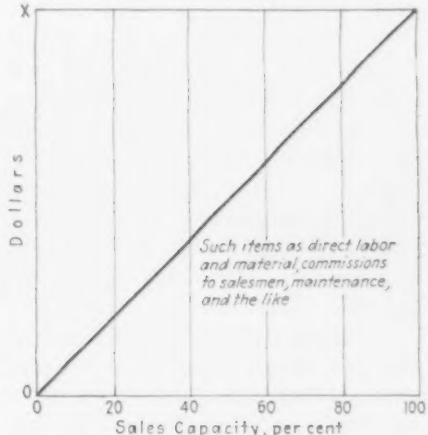
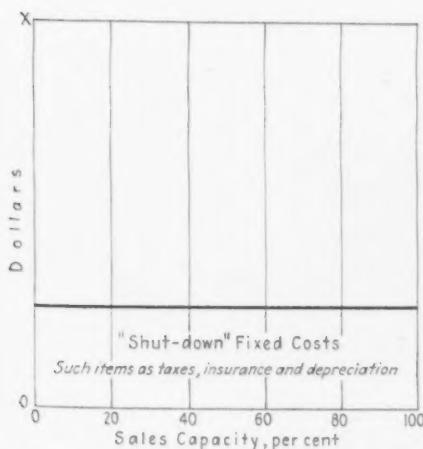


Chart A—An illustration of the different kinds of cost—fixed, variable and "fixed-variable."

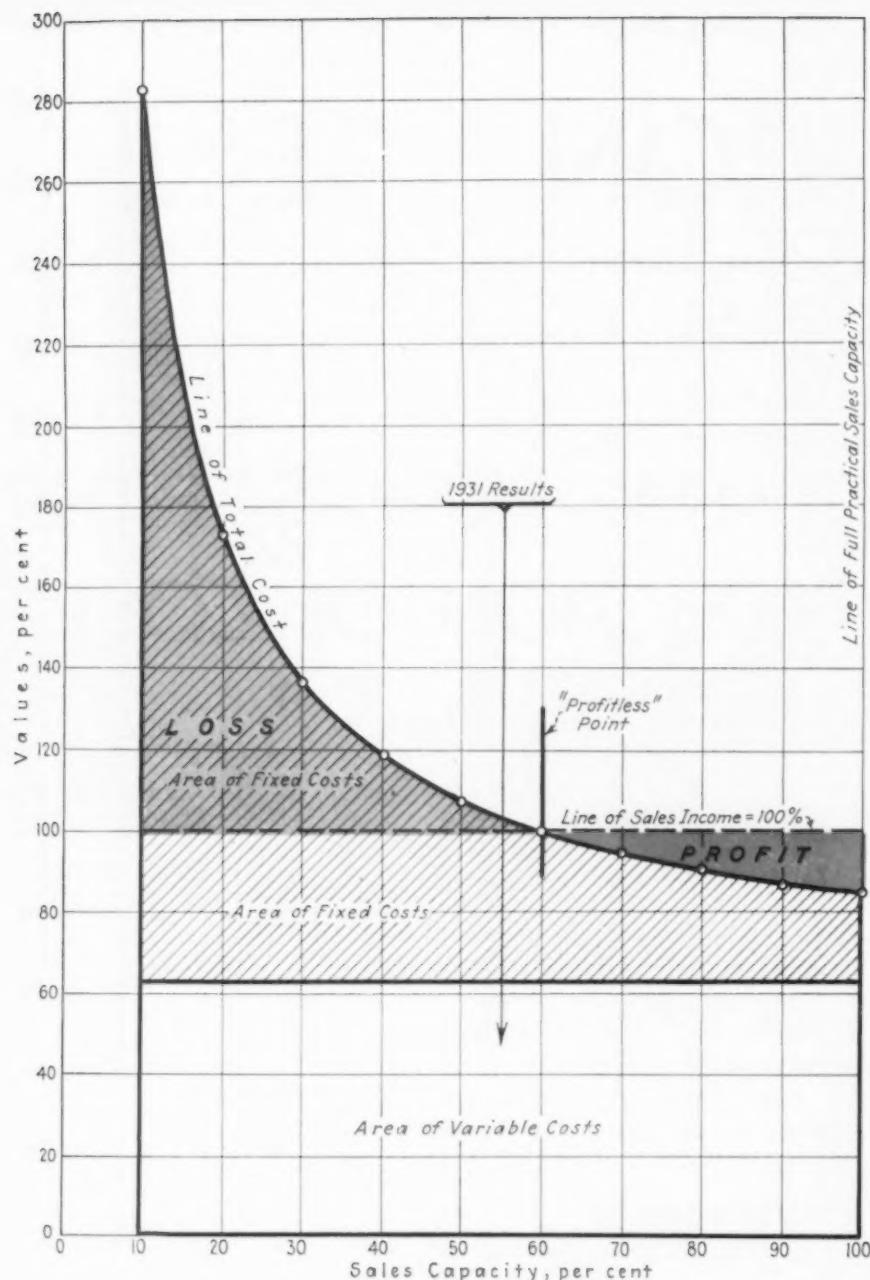


CHART B gives point to the author's conclusion that fixed costs must be attacked if profits are to be made in 1932. The chart has been made from arbitrary figures covering a hypothetical case. It portrays costs and income from sales on a percentage basis (costs as a percentage of sales).

And it is these fixed costs which cause losses in business.

Fixed Costs Must Be Attacked

The force of this conclusion will be appreciated by referring to chart B, which has been made from arbitrary figures covering a hypothetical case. It portrays costs and income from sales on a percentage basis (costs as a percentage of sales). From this chart it will be seen that if all costs were variable costs, the space between variable cost line and sales income line would represent profit, and this profit would be a constant all the way across the chart.

By superimposing the area of fixed costs on the area of variable costs, however, the curve—total cost—is the result.

This line of total cost crosses the line of sales income at some point on the capacity scale (the "profitless" point) above which and to the left losses are sustained, while below it and to the right profits are made. In the chart mentioned the point of "cross-over" is at 60 per cent of full practical sales capacity. It is assumed, furthermore, that the 1931 actual results fall on the 55 per cent line as shown, the assumed figures being:

Sales	\$1,100,000
Variable costs.....	693,000
Fixed costs	440,000
Total costs.....	1,133,000
Loss	\$33,000

It will also be apparent from a study of chart B, even if sales volume is increased (assuming that prices

making—attention of a scientific nature and on the basis of planning for profits in advance.

Industry cannot afford to wait until February or March to ascertain what was made or lost in the previous year, only to find that results are disappointing. It must develop ways and means for anticipating what the Dec. 31, 1932, showing will look like—and be governed accordingly.

The process must be "ante-mortem" in nature.

Cost Reduction Road to Profit

Profit anticipation will lead to loss prevention, and a pound of prevention is worth tons of "post-mortem" excuses.

The question, however, becomes one of the procedure to employ in bettering the profit position.

The "handwriting on the wall" clearly points to cost reduction as the way out; unless there can be increased sales volume at higher prices (and these will not be easy to get during 1932), the attack must be made on costs.

In approaching this matter of cost reduction, we must keep in mind that costs are of three kinds, as indicated in a graphic manner in chart A, which is self-explanatory.

Industry needs to give more and more attention to costs in the third classification shown on this chart, out of which will come some surprising results.

By bringing together the "shutdown" fixed costs at No. 1 and the "nucleus" costs at No. 3, all costs can then be divided into the two great groups—fixed and variable.

CHART C illustrates what may happen when 1932 is budgeted on the basis of 1931 results after efforts have been made toward cost reduction. A study of charts B and C together will show the improvement in the 1932 picture. For 1932 the "profitless" point has been brought back to 38½ per cent, and the profit area is considerably deepened.

are the same), that there will be no change in the curve of total cost, nor a lowering of the "cross-over" point on the capacity scale, which bears out the conclusion that cost reduction is the answer to our profit problem. This conclusion applies with particular force to fixed costs, especially those of the "nucleus" variety.

The problem before concerns in 1932, then, is to drop the area of fixed costs, and at the same time reduce the variable costs where possible, so as to bring the "cross-over" point lower on the capacity scale, and deepen as well as lengthen the profit area.

The tool to use in doing this is the budget.

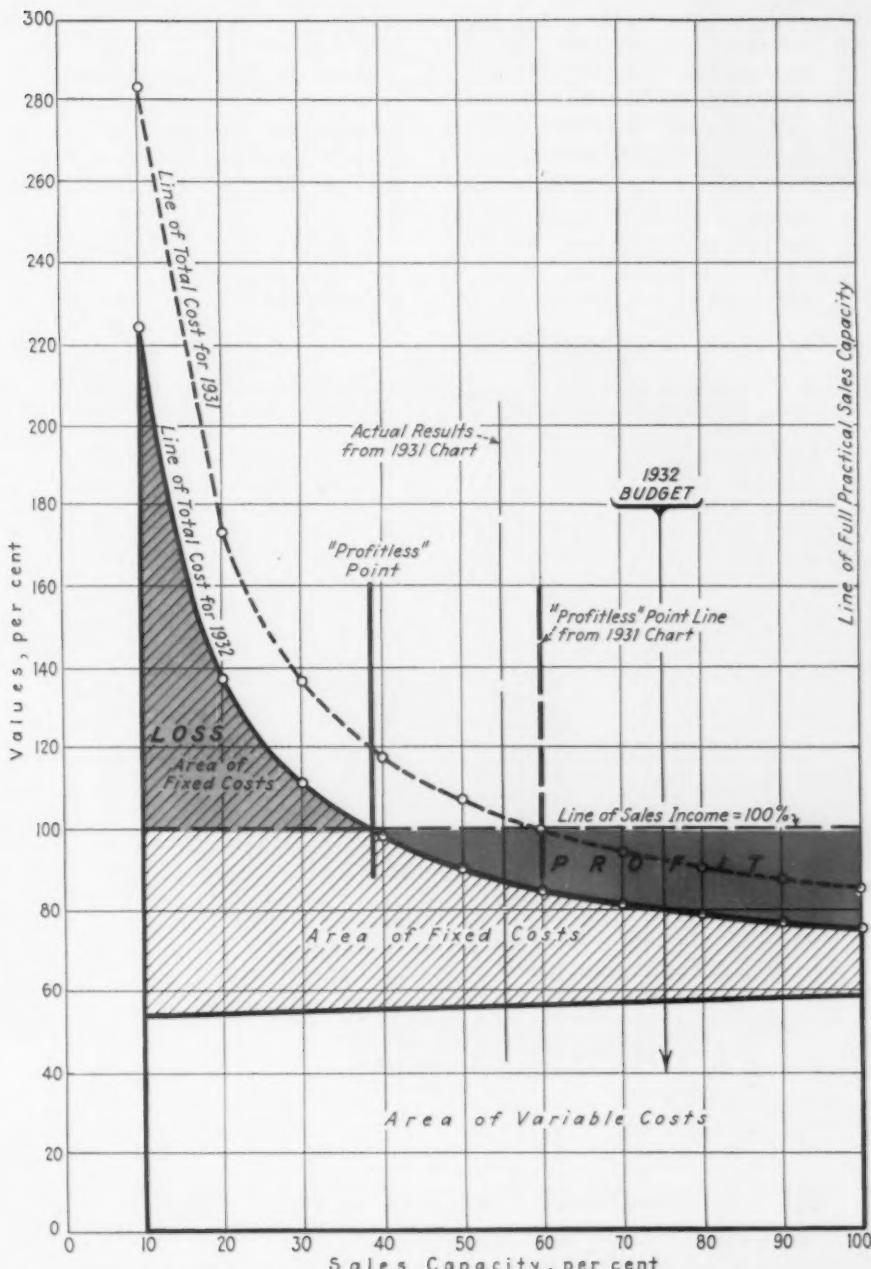
Budgeting Is Answer to Problem

And the budgeting must be "variable" in nature, because it is fallacious to measure variable actual results against a budget of a fixed character.

At this point a statement of an important principle is apropos:

To the degree in which certain fixed costs are transferred to the variable classification, profits will start to show at a lower capacity point, and widen as full capacity is reached.

It is therefore assumed that, with the 1931 results as a basis, a budget has been prepared—after investigation and efforts at cost reduction—with anticipated results for 1932 as shown in chart C, to which the 1931 total cost line, "profitless" point, and actual results have been trans-



ferred for purposes of comparison.

The improvement in the 1932 picture over that of 1931 is obvious, as will be seen by studying charts B and C as one. For 1932, the "profitless" point has been brought back to 38½ per cent, and the profit area is considerably deeper.

The assumed figures for the 1932 picture are:

Sales	\$1,500,000
Variable costs.....	\$858,750
Fixed costs.....	340,000
Total costs.....	1,198,750
Profit	\$301,250

The Knoepfel "profitgraph" was published in *THE IRON AGE* of Jan. 22, 1931. It was first used by the author in a Pennsylvania plant in 1909, since which time it has enjoyed wider application, with gratifying results. In this issue, however, there appears for

the first time a form of charting on the basis of percentage rather than dollars, in order more strikingly to illustrate the pernicious influence of fixed costs on profits.

The slant in the variable cost line on chart C is occasioned by an assumed transfer of some of the fixed cost items to the variable costs, and increasing slightly faster than a mathematical variability as the sales volume increases.

How can this be done?

Reducing "Uncontrollable" Costs

A single article could not begin to exhaust the possibilities in explaining all that might be undertaken, but two suggestions can be made which will prove most helpful:

1. *Have the controller's department assign an assistant to the analysis of all so-called "uncontrollable" costs.*

lable" costs, whether fixed (like insurance) or variable (like lubrication), out of which can come standards covering what the costs should be, and incentives paid in proportion to cost reduction.

2. Put salaries of salesmen and management staff (particularly the latter) on the same basis of incentive payment that workmen and many of our foremen are on

volume in which profits were budgeted in advance?

Chart D merely illustrates what is meant. It would take care of management salaries automatically through the three great cyclical or seasonal swings we encounter in business:

1—Below normal (depression or seasonal dips)

2—Normal

tion, from which would come adjustments of a scientific nature in management compensations. This field is a fertile one.

We are finding, in other words, that because we have called certain items of cost "fixed" there was nothing that could be done about them, for why try to reduce what is beyond one's control? We have failed in many cases also to isolate the costs of the

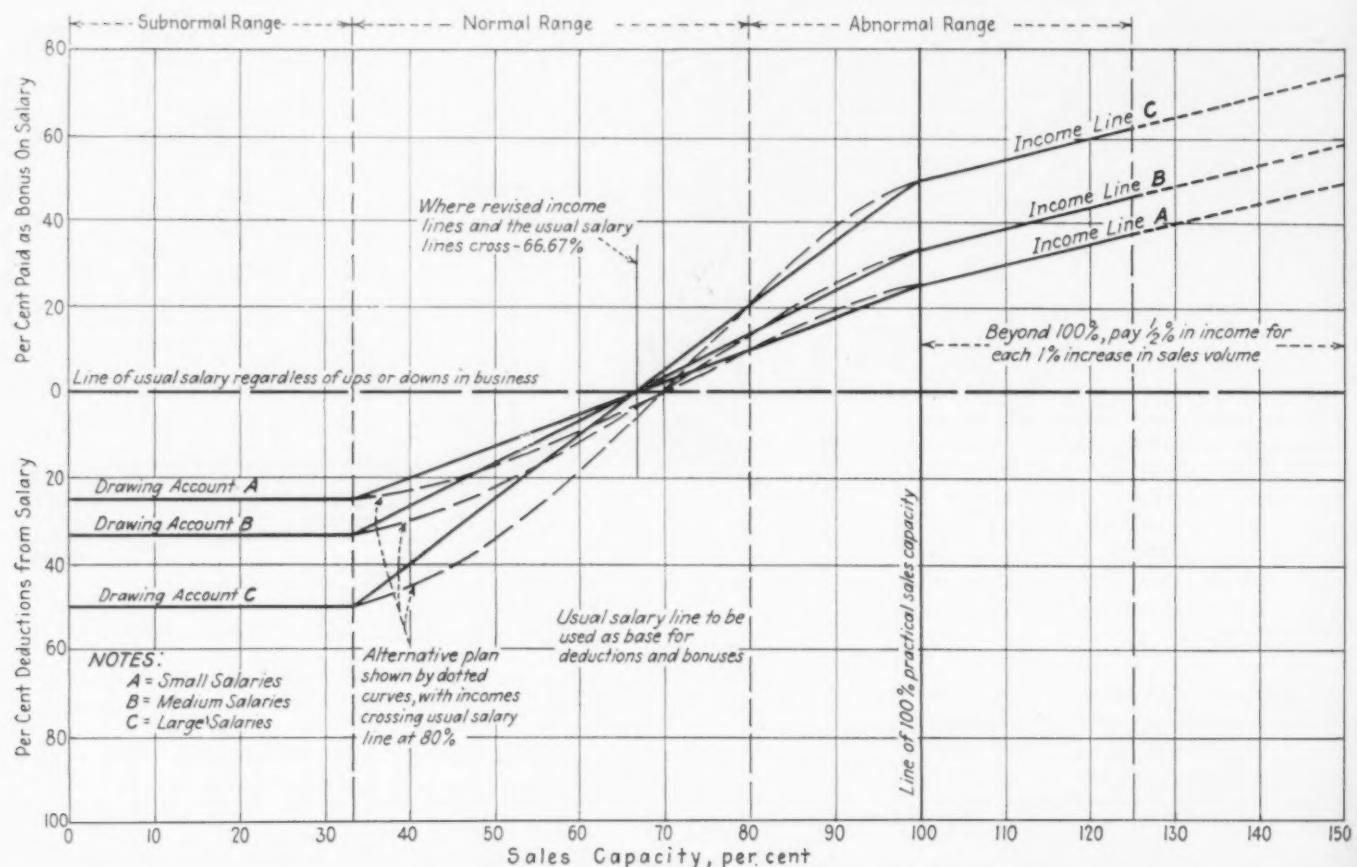


Chart D conveys the author's suggestions for control of salaries, one of the most important items of "nucleus" fixed costs. His plan is to put salaries of salesmen and management staff on a basis of incentive payment, with drawing accounts to be paid when business is below normal, usual salaries at normal and bonuses in the "above normal" periods.

at present, in which the principle is that of a wage or salary as a drawing account for time payment, with additional rewards in proportion to efficiency.

One of the major items in these "nucleus" fixed costs are the salaries of management—superintendents, office department heads and all executives, including officials. If salaries could be put on the basis of drawing accounts sufficient to provide enough incomes on which to live properly, with the balance to vary with results, it would mean a smaller fixed cost area and a curve for the variable part, becoming more rapid in swing as full capacity was approached.

And could there be any better gage for management rewards than sales

3—Above normal (prosperity or seasonal peaks).

When below normal, drawing accounts would be paid. Usual salaries would be reached at some point in the normal range, while above normal bonuses would be paid. Generally speaking, the amount of bonus in "above normal" periods should approximately equal the amount by which salaries were reduced to drawing accounts during "below normal" periods.

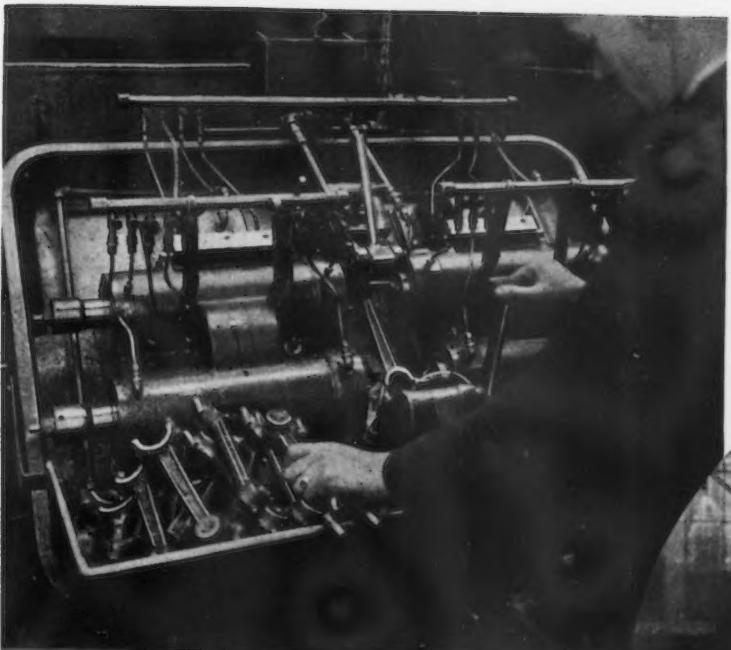
Focus on Salary Setting

A by-product of this way of going at the task of making costs more variable in nature, insofar as management salaries are concerned, would be to focus more attention on salary setting and drawing account determina-

"fixed-variable" classification and determine the fixed portions thereof. Here, again, is another fertile field. In fact, it can be promised with assurance that a study of costs for the purpose of making the division suggested will pay real dividends on the work involved.

If companies will go further and budget their business affairs on the basis herein outlined, using charts along the lines suggested in B and C, it can be safely promised that the showing as of Dec. 31, 1932, will contain more in relative profits than would otherwise be the case.

So, the answer to the question—"what about 1932 profits?"—becomes that of cost reduction, particularly of fixed costs.



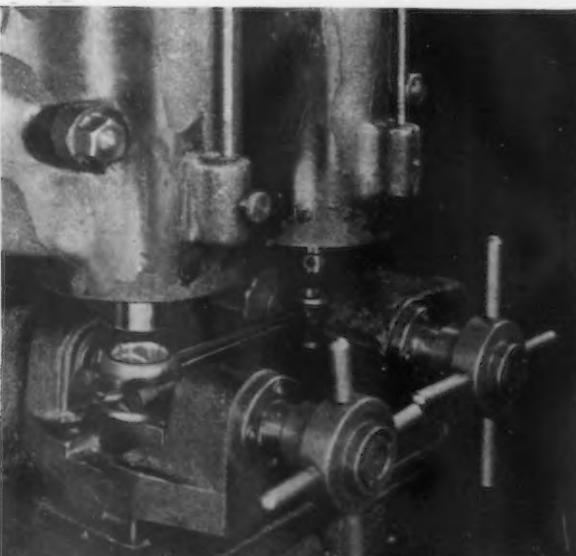
DRILLING the center holes in the connecting rods.



Some Ford Connecting Rod Machining and Inspection Methods



PRELIMINARY inspection of the finished connecting rod.



Crankshaft and wristpin ends are bored at one time on this diamond boring machine.

FINAL inspection of connecting rod in constant-temperature room.

SEVERAL TYPES OF GAS FURNACES



WHILE the mechanical phase of bolt and rivet manufacture is pretty well standardized, there are many varied types and designs of furnaces. Several interesting types are used by the Vulcan Rivet Corp., Tarrant, Ala. This company makes rivets ranging in size from $\frac{1}{8}$ to 2 in., bolts and nuts from $\frac{3}{16}$ to 2 in., and railroad spikes from $\frac{5}{16}$ to $\frac{9}{16}$ in. Rivets, nuts and bolts are cold-pressed up to $\frac{1}{4}$ in., and hot-forged above that size, while the entire range of spikes is made by the hot process.

Raw material is principally high and low-carbon steel rods, in the form of coils. These are unloaded directly from railroad cars, on a siding that parallels the storage yard and plant, by swing-post cranes. The coils are then transferred to the pickle room by other swing-post cranes, where they are pickled prior to drawing. A slight reduction amounting to 0.150 in. is given the rods in the drawing room, to correct any defects and to make them uniform throughout. This is accomplished by pulling them

through dies and coiling them again.

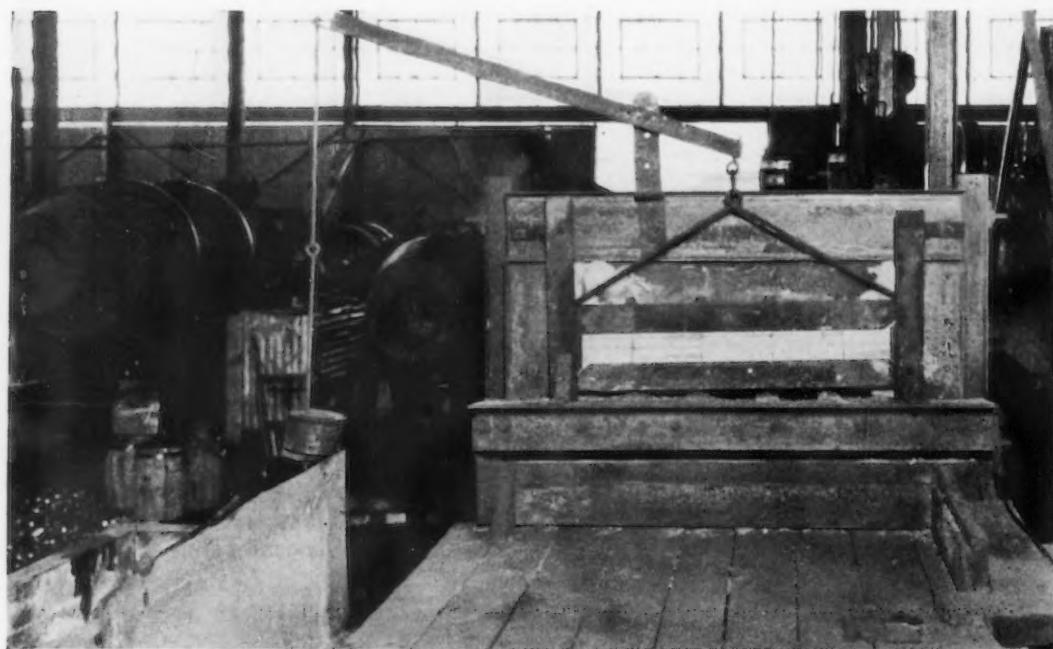
Smaller-sized rods are trucked to the cold headers, where the bolts are given round, square, flat, cone or hexagon head shapes, as required. The headers are of the conventional type, two dies move back and forth in a heavy steel frame. The rod is automatically fed through a stationary die, the first moving die spreading out the end and the second finishing the head. A tool then cuts the bolt off at the right length. Another type has two dies in tandem on the stationary end, the second being moved just enough, by cam, to shear off the bolt after the head has been formed. These machines will produce from 35,000 to 40,000 bolts a day.

Bolts and rivets are annealed in a gas-fired cylindrical furnace 6 ft. long and 3 ft. in diameter. This furnace consists of a steel shell in which revolves a steel retort lined with refractories, which is heated by two rows of eight gas burners each. The retort is hopper fed, the amount of material passing through being regulated by a dipper, which is affixed

to the charging end of the retort and revolves with it. At each revolution this dipper automatically fills itself with material and charges it into the retort, where it works through by the combined action of gravity and rotation.

Work is heated to 1600 deg. F. for about 10 min. The rivets are then discharged into steel pots and are covered up and allowed to cool slowly. The bolts are cooled in the air and, after being finished, are reheated to 1000 deg. F. and quenched in oil, to blacken. The quench is contained in a steel tank equipped with a rotating perforated steel screen with a screw on the inside. As this screen sets at an angle, the bolts are passed up and out of the tank after being quenched.

Rows of automatic machines in the trimming division trim the heads to various shapes. There are various types of machines and several unique feeding devices, and all are motor driven. The work is tumbled in barrels. The machines in the pointing division are mechanically driven, but the work is mostly chucked by hand.



SLOPING, CONTINUOUS, HEAT-TREATING FURNACE FOR KNUCKLE PINS.
At left are two rotary, gas-fired annealing furnaces for bolts and rivets.



VICES USED IN RIVET AND NUT PLANT

By F. J. EVANS

President, F. J. Evans Engineering Co.
Birmingham

The bolts are then routed to the threading machines, where the threads are rolled on.

Flat rods in coils form the stock for the nuts. This stock is fed into a machine with two punches and two dies, the first punching the hole and the second forming the crown and shearing off. The nuts are tapped in automatic hopper-fed machines of the chuck-and-spindle type. The bolts and nuts are assembled on benches provided for this purpose, and are then sent to the shipping department.

Gas-Fired Furnaces Used

All of the stock for the hot-forging process is heated in forging furnaces installed by the Surface Combustion Corp., Toledo, Ohio. Straight rods are used for spikes, the hot stock being taken from the furnace and pushed into a machine by a roll feed which points and cuts off. A gripper then holds the sheared stock while a hammer head and dies bump against it and form the head, in a single stroke. The finished spike is then released and drops into a tote box.



HEATING of straight or coiled stock for making rivets, bolts, nuts, spikes and knuckle pins is done in a variety of gas-fired furnaces in a Southern plant. Each furnace for this work, as well as those used for annealing, has been designed for its specific use. Some are continuous and semi-automatic; some heat the ends only. All are controlled automatically as to temperature regulation and some as to interior atmosphere

proportioning device by which the desired ratio of gas and air is obtained.

As a reducing atmosphere is required in the furnace, the burners are set for this. Thereafter they automatically maintain the air-gas ratio, regardless of the flow of gas or the variations in the volume of work passing through the furnace. The finished spikes are weighed, sorted into kegs and trucked to the storage room.

In another set-up for the large sizes of spikes, the furnace is of brick, steel incased, and 7 ft. long,

TWO furnaces side by side. The inclined furnace in foreground is a continuous heat-treating furnace for knuckle pins. The horizontal furnace in background heats rods for a continuous rivet machine.





FORGE for heating ends of short rods used in the hand-fed bolt machine at left.

6 ft. wide and 4 ft. high. It is heated with four gas burners, two on each side. All of the burners on these furnaces are of the high-pressure velocity type, equipped with venturi-type gas-air proportioners. This furnace holds 60 rods at a charge; these rods are removed, one at a time, and pushed into the spike-making machine by hand. The finished spikes drop out on to a conveyor which dumps them into steel pots for slow cooling. This is the only heat treatment the spikes receive.

Two bolt and rivet set-ups are almost identical, furnace and machine, with the one just described. The hot rivets are dumped by conveyor into pots and then sorted and kegged directly on scales. These kegs are put

on to skids which are moved to storage on gasoline-driven high-lift trucks. The bolts, however, are first routed to automatic, hopper-fed trimming machines, where the flash is trimmed in a punch and die. They are then tumbled, pointed and threaded, the threads being cut in special machines instead of being rolled.

A different method, used in forging bolts 6 in. and more in length, consists of first cutting blanks of the correct length from the rods. These are heated in a slot-type forge, 5 ft. wide and 2 ft. square in cross-section, which sets on legs. It is of brick, steel incased, and is heated with three gas burners, set just below the slot. This slot extends across the

the entire face and is just high enough to permit the blanks to pass readily. Only one end of the blanks protrudes into the heating chamber, as only about 2 in. of the stock is heated. A boy manipulates the stock in the furnace and hands the hot blanks to the machine operator as needed. The operator puts the hot end into the header, which forms the head with a double die, as explained earlier. The bolts then pass through the other machines as described.

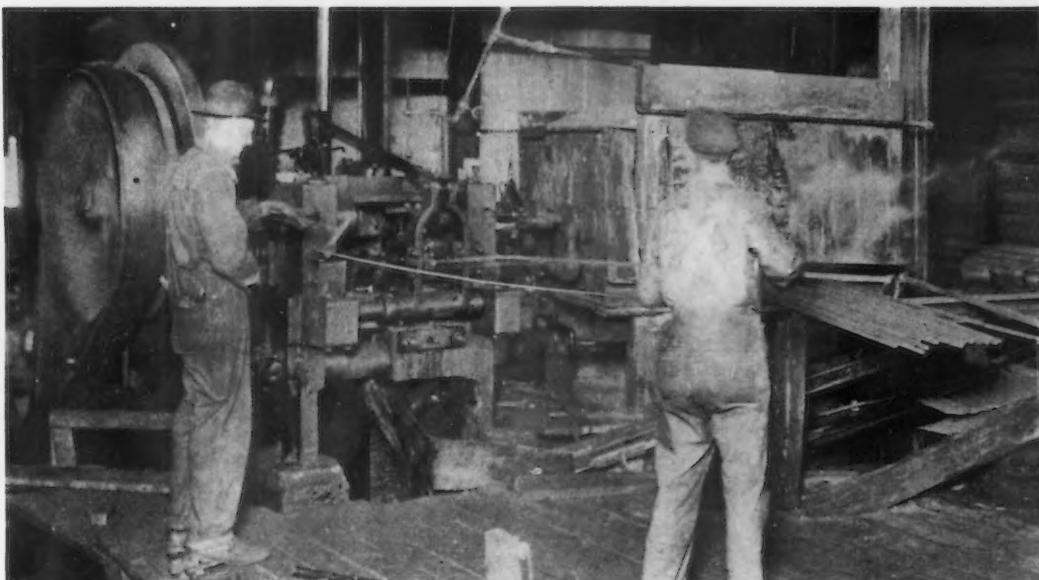
Knuckle pins, another product made at this plant, are given a special heat treatment in a brick furnace of unique design. This furnace is 16 ft. long, 5 1/2 ft. wide and 4 1/2 and 6 1/2 ft. high at the two ends. The hearth slopes at a 10-deg. angle and



ROD-HEATING furnace for continuous rivet machine. Straight rods are pushed through the furnace into the gripper of the machine. In the foreground is the delivery side of a conveyor removing knuckle pins from quench tank.

▲▲▲
HAND-FED bolt machine served by heating forge in which the ends of rods are heated.

▼▼▼



is equipped with alloy rails on which the work slides by gravity from one end to the other. There are eight gas burners, four on each side, and a temperature of about 1450 deg. F.

is maintained. The pins are discharged into an oil quench provided with an elevator conveyor which moves them through the quench tank at the uniform rate of 4 ft. a minute,

and discharges them into tote boxes.

All of the furnaces here are equipped with thermocouples connected with indicating pyrometers through multiple-point switchboards.

Welded Bomb Bodies Withstand Impact Tests

BOMB bodies manufactured by welding forge steel nose and tail sections to the cylindrical body, which is made of a single piece of plate steel welded longitudinally, were tested recently by the United States Army at the Aberdeen Proving Grounds in Maryland. All welding was done by the automatic metallic arc process at the plant of the A. O. Smith Corp., Milwaukee.

The object of the test was to determine the strength of the 100-lb. demolition bomb T3 when dropped on standard hard surface. The bombs were weighed empty, loaded with sand, equipped with tail impact pressure gage and again weighed. The cannon pressure cylinders were measured before and after impact of the bomb. Seven bombs were dropped from an altitude of 4000 ft., others from an altitude of 5000 ft., and sev-

eral were dropped from an altitude of 2000 ft. After impacts, the bombs were recovered from the hard surface, photographed and the bodies examined for deformation and cracks. The flight of the bombs was observed

from the airplane and from the ground.

Both the longitudinal and circumferential welds on all bombs withstood these standard hard-surface tests; none of the bomb bodies showed any signs of cracking or splitting open on impact. There was no perceptible difference in the amount of deformation in the bomb bodies dropped from 4000 ft. and those dropped from 5000 ft. The flight of all bombs was especially good.

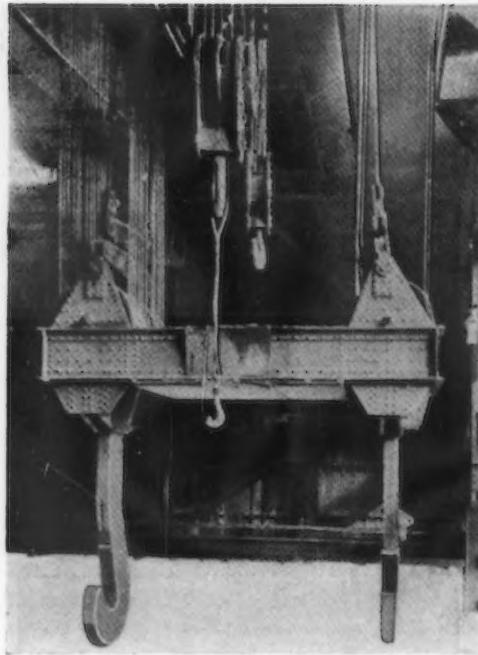
Demolition bomb after impact on hard surface. Dropped from an altitude of 5000 ft.



Bomb dropped from an altitude of 4000 ft. after having struck a hard surface.



Demolition bomb with fin assembly, showing welded circumferential seams.



ELECTRIC EQUIPMENT FOR ROLLER-BEARING CRANES

By JAMES A. JACKSON,
Industrial Engineering Department,
General Electric Co.,
Schenectady, N. Y.

THE use of roller bearings for all crane bearings is becoming more common and the decreased friction must be given serious consideration when applying the electric equipment, particularly on the bridge and trolley motions. Many cranes are powered with direct current and use series-wound motors on which the speed increases rapidly as the load decreases. The decreased friction of the roller bearings permits very high speeds to be reached unless due care is taken in selecting the size of motors and the gear ratios to be used with them. Furthermore, the increasing use of tapered-tread truck wheels tends to eliminate flange friction, thus further reducing the load on the bridge motor. Cases are known on such cranes where the actual free running speed of the bridge has gone well over double the specified free running speed. These high speeds which are attained on over-motored cranes impose much greater duty on the foot brake, subject the building and crane structures to much greater stresses and impact loads, require more control equipment, and generally increase the difficulty of handling the load on the hook to prevent it from swinging violently. These operating characteristics make the crane a more dangerous piece of machinery, increase the maintenance on both the crane and building, and give the operator a speed which may be greater than he can use effectively, thus reducing the efficiency of the crane. All of this can be avoided by carefully selecting the correct size of

motors and the right gear ratios to be used with them.

Tendency Is to Over-Motor Cranes

A strong tendency is shown to over-motor cranes and, while this is not so serious on the hoist motion, it does cause the objectionable operating features as previously mentioned for the bridge and trolley motions, particularly on roller-bearing cranes. Tests have been made on three roller-bearing cranes with capacities of 250 tons, 50 tons and 15 tons, and complete data such as weights, specified speeds, gear ratios and truck-wheel diameters obtained so that the test data could be checked against calculated data. Also new calculations were made using smaller motors and larger gear ratios to determine whether equal or im-

proved operating characteristics could not be obtained without any sacrifice in the operation as obtained with existing equipment.

In making the new calculations, due consideration was given to the fact that, where two motors are used on the bridge motion, one of them must be able to handle the bridge under emergency conditions. Also, it has been recognized that physical limitations frequently prevent the use of very large gear ratios on the bridge motion and that usually only two reductions can be conveniently obtained. In this connection, the suggestion is made that, where a large gear ratio seems desirable, it might be obtained by using one of the many compact speed reducing units now on the market, and that the additional cost of this unit would probably be saved in the lower cost of the smaller motor and control equipment.

Comparison of Specified and Actual Performance

Referring to Table I, the data on columns headed A are taken from tests or are calculated from test data and data supplied by the crane manufacturer on the cranes exactly as built and installed. In the columns headed B, the same cranes are used except that smaller motors and larger gear ratios are used, the gearing being figured to hold down the maximum free-running speed with load to 15 per cent above the specified free-running speed.

The motors in Item 3 of the table are all direct-current series mill-type

NEW aspects in crane motorization and control are introduced by the application of roller bearings in this type of equipment. A conception of them is necessary for the crane designer and almost as essential for the crane purchaser and user.

Mr. Jackson, in this article, presents some pioneer investigations on this subject, and shows how motor sizes may be materially reduced for the benefit of operating efficiency.

motors strictly in accordance with the standard specifications of the Association of Iron and Steel Electrical Engineers except that the half-hour rating and speed is used instead of the standardized one-hour rating. The two larger cranes have twin motor drive on the bridge.

Item 4 gives, in columns A, the total gear ratio as actually used, while columns B give the total calculated gear ratio which, with the motors in Item 3, will give the specified bridge speed plus 15 per cent with rated load on the hook, the 15 per cent excess speed being a margin to allow for unknown and variable friction losses. This margin should insure that the crane will meet its specified speed with rated load on the hook.

Item 6 includes all gearing losses and all bearing losses between the motor pinion and the truck wheel, but does not include losses in the truck-wheel bearing, wheel flange and tread friction, truck-wheel hub friction, or friction due to misalignment of the

Operating characteristics with resistor layout and relay setting for 150 per cent average torque on the resistor.

	TABLE II	250-Ton Loaded	50-Ton Loaded	15-Ton Loaded
Item 11 B....		6.5	8.7	9.6
Item 12 B....		0.52	0.58	0.52
Item 13 B....		1.1	1.6	1.18
Item 15 B....	220%	220%	220%	220%
Item 16 B....	150%	150%	150%	150%

crane, all of which are combined into one value called "rolling friction" and given under Item 18. The efficiencies in Item 6 were, in two cases, given by the crane builders and, as all cranes had two gear reductions and about the same number of bearings, the same efficiency values were used on all cranes.

Overspeeding Increases Brake Duty

Item 7 gives the speed specified by the owner with full load on the hook and it is assumed that, in specifying this speed, he expected it to be the

maximum speed reached when running on a level track of sufficient length to permit the crane to reach a constant speed with rated load on the hook. It has also been assumed that, in specifying this speed, the owner has sufficient knowledge of his production requirements to know that this speed will do his work, and, further, that the crane runway and its supports have been designed to stand the stresses produced by a crane of known weight operating at this speed. With these assumptions in mind, Items 8, 9 and 10 in columns A become quite interesting where the no load bridge speed as actually measured by a checked tachometer on the motor shaft showed the three cranes to be running at 218 per cent, 167 per cent and 172 per cent speed respectively, while calculated speeds (using test data as a basis for the calculation) with full load on the hook are 178 per cent, 147 per cent and 144 per cent respectively of the owner's specified speed. Now as the braking effort required to stop equal weights in

Operating data and efficiency of 250, 50 and 15-ton overhead traveling cranes equipped with roller bearings, as affected by installing smaller motors and higher gear ratios. Bridge motion only considered.

TABLE I
BRIDGE MOTION ROLLER-BEARING CRANES

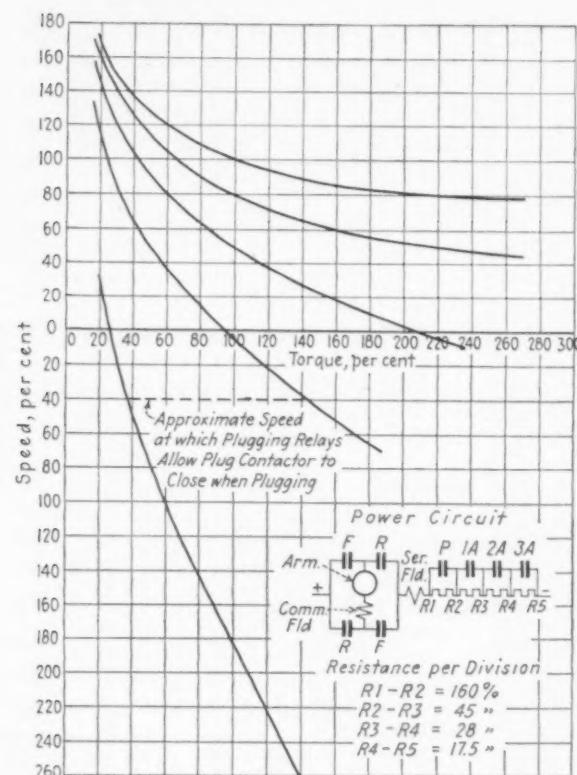
	50-Ft. Span 250-Ton		96-Ft. Span 50-Ton		67-Ft. Span 15-Ton	
	A	B	A	B	A	B
1. Rated load in tons and span...						
2. See footnote						
3. Half-hour rated horsepower and speed						
4. Total gear ratio.....	2-135 Hp. 387 R.P.M.	2-65 Hp. 430 R.P.M.	2-65 Hp. 430 R.P.M.	2-45 Hp. 460 R.P.M.	1-33 Hp. 500 R.P.M.	1-19 Hp. 560 R.P.M.
5. Diameter of truck-wheels.....	17.1 to 1 30 in.	25.8 to 1 30 in.	13.6 to 1 27 in.	18.7 to 1 27 in.	15.84 to 1 24 in.	17.6 to 1 24 in.
6. Assumed efficiency from motor pinion to truck-wheel gear...	90%*	90%	90%*	90%	90%	90%
7. Specified bridge speed in feet per minute with full load on hook	200	200	300	300	300	300
8. Actual free running bridge speed in feet per minute.....	436† 218%	356 178%	286 143%	230 115%	505† 167%	440 147%
9. Per cent of specified speed.....						
10. Ratio of braking effort required to stop in a given distance from speed in 8. Braking effort to stop equal load from specified speed in 7 equals 1...						
11. Time in seconds to accelerate to specified speed	4.76	3.17	2.05	1.33	2.80	2.16
12. Average rate of acceleration in ft. per sec. per sec. from standstill to specified free running speed	3.61	4.24	6.0	8.81	4.8	5.73
13. Average rate of acceleration in ft. per sec. per sec. while motor is on resistor.....	1.0	0.78	0.55	0.4	1.04	0.87
14. Rate of acceleration immediately on starting from rest.....	1.0	0.805	0.69	0.54	1.08	0.95
15. Approx. maximum torque peak while accelerating. Expressed in per cent of $\frac{1}{2}$ -hr. rated torque of motor.....	1.6	0.95	1.07	0.56	1.5	1.09
16. Average per cent of $\frac{1}{2}$ -hr. rated torque of motor while accelerating on rheostat.....	95% 55%	115% 71%	95% 52%	134% 74%	100% 38%	119% 70%
17. Per cent of $\frac{1}{2}$ -hr. rated motor torque to propel at constant speed	7.5%† 12.7%	11% 19.3%			10.6%† 14.2%	12% 16%
18. Rolling friction in pounds per ton total weight.....			9.38†		12.8†	14.27†

A—These columns give data on cranes as actually installed. Values marked thus † were taken from test readings or calculated directly from them. All other values were calculated using test data as a basis wherever possible. Efficiencies marked thus * were furnished by crane builder and all other efficiencies were assumed to be the same.

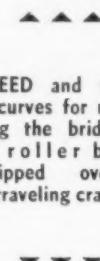
B—These columns give all calculated values on the same cranes but using smaller motors and larger gear ratios to hold down the maximum free running speed with full load on hook to 15 per cent above the specified speed. The 15 per cent increase is to allow for variable and unknown friction values and insure that the crane will meet its specified speed.

equal distances varies as the square of the initial speed, these excessive speeds require a large increase in torque and heating duty from the brake as shown in Item 10, and, unless the brake has been designed for this excess duty, the coasting distance of the crane will be much in excess of what was expected and accidents may occur. If the brake has been designed for the excess duty, then the crane track supports and the building structure will be subjected to greatly increased stresses. If, therefore, it was designed for the stresses due to the specified speed,

tor—first, the gear ratio, and, second, the control equipment. The torque of the smaller motors is multiplied by a factor increased in direct proportion to the increased gear ratio; consequently a certain torque delivered at the crane truck wheel requires a smaller torque from the motor. The rate of acceleration is proportional to the torque delivered to the truck wheel; consequently the rate does not decrease in proportion to the size of the smaller motor. With control equipment adjusted for the same time relay setting and the resistor laid out for the same percentage current peaks,



SPEED and torque curves for motorizing the bridge of the roller bearing equipped overhead traveling crane.



building maintenance will be high due to rivets and bolts loosening up or shearing off. Impact loads at bad rail joints and when hitting the bumpers will be greatly increased and may cause stresses well beyond those for which the building was designed.

Items 8, 9 and 10 in columns headed B show how this situation can be corrected by using smaller motors with a larger gear ratio, and in each case the gear ratio was calculated to give 115 per cent of the owner's specified speed with rated load on the hook.

Smaller Motors with Increased Gear Ratios

With smaller motors, the natural questions to ask are: What will be the effect on acceleration, and will one motor on a twin drive handle the crane in an emergency?

The answer to the first question depends on two factors besides the mo-

the rate of acceleration will be somewhat decreased when using the smaller motor. If, however, it is permissible to use higher percentage current peaks on the smaller motor, the acceleration rate can be brought back reasonably close to the same rate as obtained with the larger motor and lower gear ratio.

In calculating the data in Items 11 to 16 in the tabulation, a resistor layout was used, giving the speed torque characteristics as shown in the chart accompanying this article, and the same time setting for the accelerating relays was assumed in every case in order to put the data on a comparable basis.

Torque of 150 Per Cent Used for Accelerating Duty

A study of the acceleration rates in Items 12, 13 and 14 shows reduced rates for the smaller motors

and larger gear ratios, but a study of the torque values in Items 15 and 16 shows that in no case were either the larger or smaller motors being used efficiently. The highest average accelerating torque is only 76 per cent of the one-half hour rated torque and with the exception of the 15-ton crane under columns B, the maximum instantaneous torque peak is only 134 per cent of the one-half hour rated torque. It is generally recognized that crane or mill motors can be safely used on accelerating duty with an average torque of 150 per cent, while accelerating on the resistor and with maximum instantaneous torque peaks of 200 per cent or over. If, therefore, in calculating Items 11, 12, 13 and 15 in columns B, a resistor layout and relay setting is used which gives 150 per cent average torque on the resistor (Item 16), the values of Items 11, 12, 13, 15 and 16 in columns B would appear in the table as shown in Table II. Item 14 can be changed or not as desired, as it depends on the initial torque application on the second controller point, which can be adjusted to give the correct start.

This works the motors up to where crane motor should be worked while accelerating, it gives faster acceleration while on the rheostat than is obtained in columns A, and the total time to reach specified speed is not unduly longer than found in columns A. As a matter of fact, the cranes will be speedier on any length of travel which is too short to permit the crane to get above approximately two-thirds of specified speed, and a large percentage of crane movements are relatively short.

Motor Requirements for Twin Drives

On the twin drives, it is quite obvious that one motor can handle the load in an emergency, as Item 17 shows that for the smaller motors only 19.3 per cent torque for the 250-ton and 16 per cent torque for the 50-ton crane is all that is required to propel the crane. With one motor out, these figures are doubled to 38.6 per cent and 32 per cent on the remaining motor. As a crane motor can be safely used up to 150 per cent to 200 per cent torque during acceleration, an ample margin is left to accelerate the crane with one motor.

With reference to the maximum torque peaks in columns A, they are all values calculated from the speed-torque curves, but, when possible, they have been checked by taking the maximum throw of the ammeter during acceleration and the test values check the calculated values within a reasonable degree of accuracy. In several cases in columns A the maximum torque peak is given as 95 per cent.

▲▲▲
THIS 15-ton yard crane uses roller bearings throughout. If it were motored according to the accepted standards for plain bearing design, it would overspeed, overrun on braking, cause excessive strains in the supporting structure and present an operating hazard.
▼▼▼



The reason for this is that point 2 on the controller (point 1 is used for plugging only) is laid out to give 95 per cent torque at standstill, and, had it been laid out to give a lower value at standstill, the maximum peak would have been lower, as the peaks on all other controller points are below 95 per cent.

A few words of explanation may be in order with reference to Item 18 in the table, as the use of "rolling friction in pounds per ton total weight" is perhaps somewhat out of the ordinary as a method of determining the gearing and the power requirements on a crane. This method has been in successful use for many years in determining the power requirements for freight and passenger trains, and a great deal of reliable data is available in that field. It seems logical to apply it to cranes, particularly to those using roller bearings, as it combines into one factor a number of separate friction

losses which are extremely difficult to separate into reliable individual values.

Undoubtedly more data are required on this factor in the crane field, but it is relatively easy to obtain by taking an ammeter reading after the crane has reached a constant speed as determined by a tachometer on the motor shaft and reading the corresponding torque value from the torque curve of the motor. This torque value can be converted into "pounds per ton rolling friction" (sometimes referred to as "draw bar pull per ton") as the gear ratio, truck-wheel diameter and total weight of the crane being tested are all known.

It should be borne in mind that erroneous conclusions may be reached if an attempt is made to compare, in Table I, the values given for one crane against those given for a crane of a different load rating. One reason for this is that the ratio of live

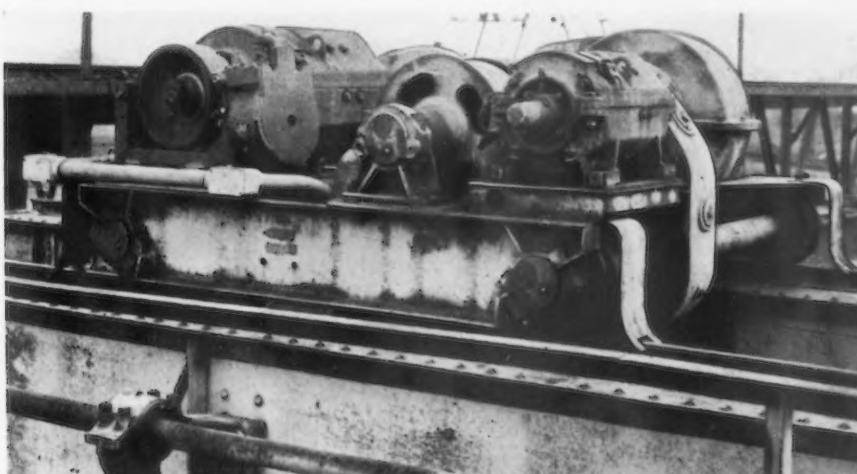
load to total load differs greatly for the three cranes, due largely to the different spans and to the duties for which they were designed.

Alternating Motors Have Fixed Maximum Speeds

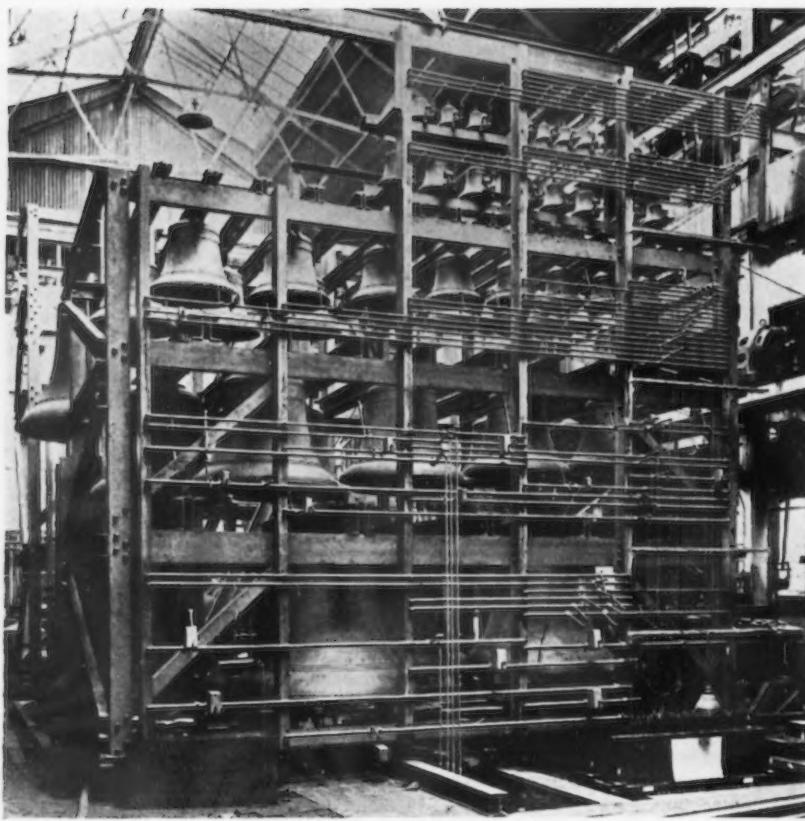
The problems treated in this article are not encountered on cranes using alternating current motors, as these motors have a fixed maximum speed within narrow limits regardless of the torque load. Also, they do not enter to any great extent on the hoist motion of direct-current cranes, as the dead hoisting load is the predominating factor in determining the power requirements rather than accelerating requirements, although light hook speeds may become dangerously high with roller bearings if too low a gear ratio and too large motors are employed.

Almost as good a case can be made out against over-motoring the trolley motion as for the bridge motion. While the ratio of friction load to accelerating load is not so large as on the bridge motion, the variation in the ratio is much larger and the length of runway is usually much shorter than the bridge runway. Further, the operator must control his trolley entirely electrically, as he has no foot brake to help him out in case of power failure or misjudgment on his part.

Excessive speeds are, therefore, to be avoided on the trolley motion, and the use of worm gearing is finding some favor for this purpose. Another way of overcoming these high speeds is by using compound wound motors, but this requires extra trolley wires for the shunt field, which are objectionable.



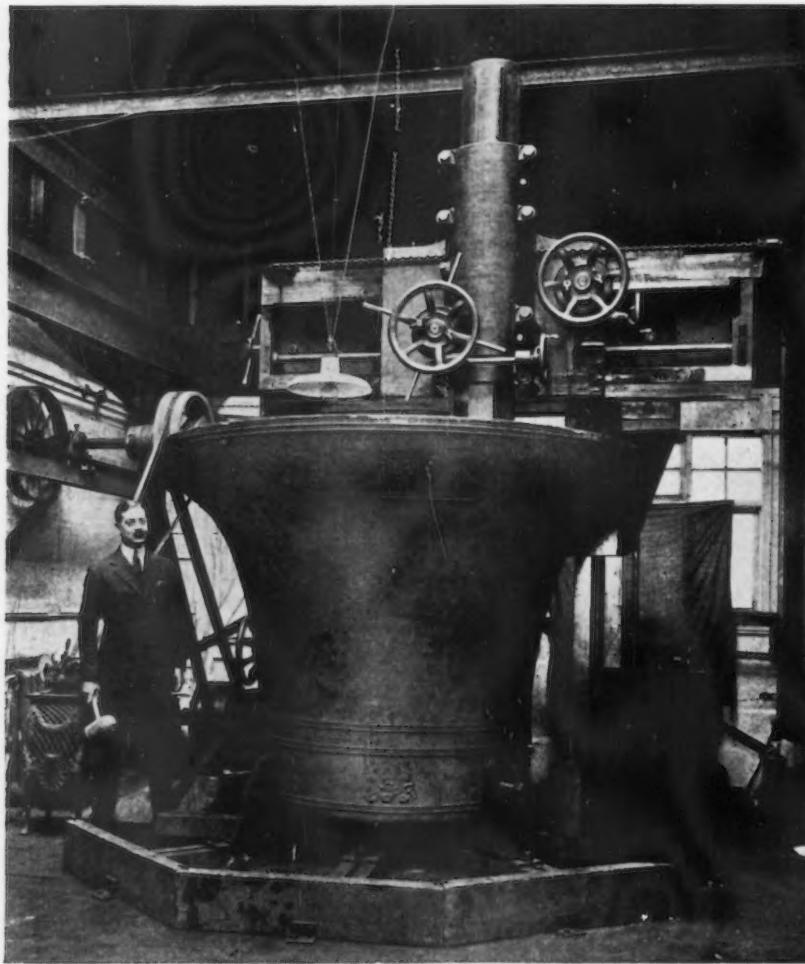
Close-up of trolley on 15-ton roller bearing crane shown above. The bridge motor is 33 hp.; the trolley motor, 6 1/2 hp. Note roller bearing construction.



A MODERN carillon is a structure of steel beams and channels supporting thirty to fifty or more bells.

(Below) The tuning of large bells is a painstaking operation requiring skill and experience on the part of the tuner. Metal is removed from the interior of the bell to alter the pitch and vibrating qualities.

MAKING LARGE BELLS FOR A CARILLON



ON clear Sunday mornings in New York hundreds of people wandering along Riverside Drive in the Grant's Tomb district stop at times to listen to the mellow, reverberating chimes from the carillon of Riverside Drive Church. But few of these listeners realize that the clear notes they hear were first sounded in the hazy atmosphere of a humble foundry in England.

Bells have intrigued the fancy of foundrymen ever since the earliest records of cast metal. Single bells are as old as history, but groups of tuned bells are a more recent development. Ancient spires in Holland and Belgium contain octaves of bells accurately tuned to the chromatic scale. The tuning skill of the old bell founders of Europe was lost for some two hundred years and the art of tuning had to be redeveloped when English firms turned to bell casting in the late years of the nineteenth century.

The carillon for the Riverside Drive Church, one of the largest in the world, was made at the Croydon Bell Foundry, Croydon, England. The Bourdon bell or largest of the group of bells weighs 26 tons as mounted, with head stock and clapper. The single casting of the bell proper weighs over 18 tons, which places it

among the three or four largest bells in the world.

As may be supposed, the casting and tuning of such large bells is a difficult and painstaking task. The molds are built up largely by hand and are set in pits in the foundry floor for the pouring. The outer mold or cope is formed in a specially designed cast iron case or flask.

This flask is built up in sections and has a form similar to that of the completed bell, thus giving the mold a uniform wall thickness which helps to hold the sand in place. On the inside, the flask is provided with irregular shaped fins to help further in holding the sand when the mold is inverted as it is during pouring. The sand consists of a mixture of several different English molding sands selected for adhesive properties combined with porosity. With the sand is mixed cow hair.

After the mold has been roughly formed by hand a strickle board is fixed to an arm and central bar and is swept around the sand until the required shape has been formed.

The inner mold, which is called a core in a bell foundry, is built up on a heavy cast plate. It is important that this plate be sufficiently rigid to hold the core without springing when supported at four outer lugs, as it must be picked up by these lugs when lowered into the pit.

The body of the core consists of bricks placed tier upon tier and filled in and covered with the same sand mixture as used for the cope. A smooth, accurate surface is secured by sweeping with a strickle board of opposite contour to that used on the outer mold. The board is centered at the top by means of an adjustable bracket which extends out from the wall to a point exactly over the center of the core.

After this initial sweeping, which leaves the molds with the first or rough finish, the molds are thoroughly dried before the final surface is applied. This drying is done in large bake ovens and in the case of large bells takes from five to eight days. After baking, the models are brought out to the foundry floor and coated a second time with a finer mixture of loam and are then returned to the ovens for further drying. Following this the final touches are put on. This consists in blacking the molds and sleeking the surfaces so that the castings will come out clean and smooth. At this stage inscriptions and other details are added. Inscriptions are usually made up on a separate form and pressed into the surface of the outer mold, which makes the letters embossed on the outside of the finished casting.

When the molds are completed the core is carefully set in position at the base of the pit and the cope is then



The pouring of large bells is from a single ladle through a top gate.

lowered over it and adjusted to an accurate position by means of small test pieces of clay placed at various points on the core. When the head molder is sure that the space between the surface of the core and the inner surface of the cope mold is uniform at all points and that the thickness of the casting will be as planned, he has the pouring top clamped in place. One central gate is used and pouring is done slowly and continuously from one large ladle.

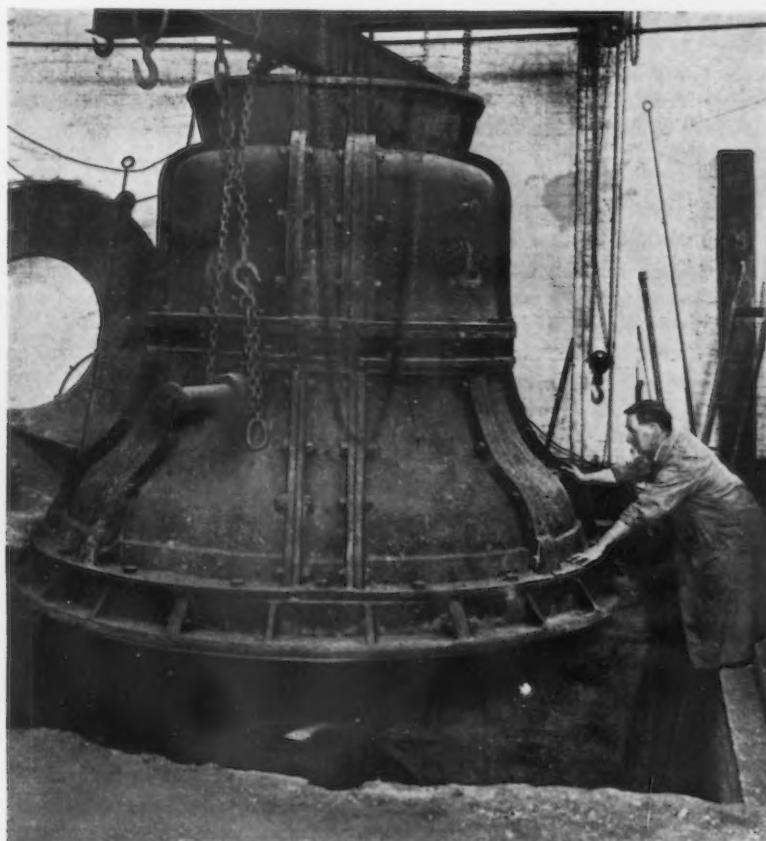
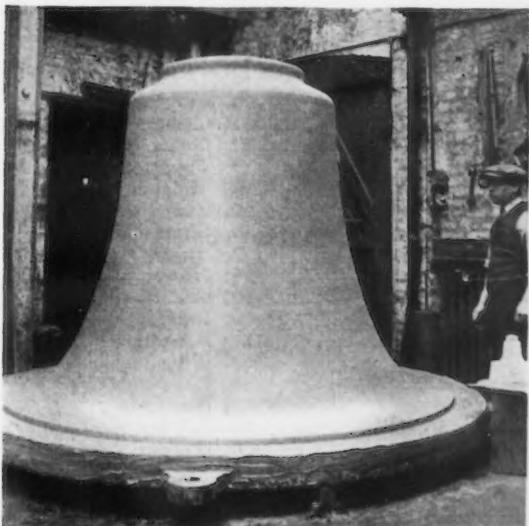
After casting, the metal is allowed to cool for one or two days, depend-

(Concluded on page 250)

▲ ▲ ▲

THE cores for large bells are built up on heavy cast iron plates to facilitate handling in and out of the bake ovens and into the pouring pit.

The cope mold (right) which is made up in a specially shaped flask, is carefully lowered over the core and accurately adjusted for wall thickness of the casting.





KEEPING WHITE RUST FROM ZINC

A COMMON corrosion found on the surface of zinc-coated products has been called by the industry "White Rust." It has been found under many practical conditions, and on practically all kinds of galvanized products.

Specific cases have been noted on zinc-coated water pipe stored in warehouses, and out in covered racks in sheds; on range boilers that have stood in the warehouse for some time; on metalware that has been in storage, and where the windows of the warehouse have been opened during rainy weather; on metalware articles that have been hot galvanized, quickly dipped in a water testing vat, and piled; in cross-arm braces that have been cooled in a water tank and stored; in secondary racks; in wire that has been coiled and stored in a damp place, or where moisture could condense; on sheets that have been stored in a warehouse where occasional dampness might enter; on shipments of galvanized pipe to San Francisco and other distant points and to destinations in foreign countries. In fact, it may be found on almost any kind of zinc-coated products stored in damp places, or where moisture can condense and set up conditions favorable to corrosion.

It Consists of Several Salts of Zinc

To appreciate fully the conditions under which white rust will form, it is necessary to know what white rust is. Chemical analyses of this material show it to be zinc oxide, zinc hydroxide and zinc carbonate. If the reaction has taken place under conditions where sea water has been present, chlorides may be found also, due to the action of the salt and magnesium chloride which are present in variable quantities in sea water. Mixtures of basic zinc salts, also, may be found in the products of corrosion. Just what the corrosion products are depends to a very large extent upon corrosion conditions. These are endless in number, but for general purposes they may be grouped into at least two major classes, as follows:—

1. Conditions of a very large excess of available water, and a minimum

amount of gases, such as air, oxygen, carbon dioxide, etc. The products of corrosion under this condition consist mainly of zinc hydroxide, with a small amount of zinc oxide, zinc carbonate and other zinc compounds.

2. Second is the general condition of a large excess of gases and confined moisture, dampness, dew, and moldy and musty conditions in general. The products of corrosion under these conditions are largely zinc carbonate, zinc oxide, and basic zinc oxides and hydroxides. Which of these materials is most abundant depends upon which corrosion factor has the most favorable conditions. In water, hydroxides would be formed; in air, oxides and carbonates would be formed.

A common example of white rust which almost every practical galvanizer has seen is the white rust often found on shipments of slab zinc. A specific example was seen in a shipment of 510 slabs of zinc, in a car re-

ceived in a plant some time ago. The roof of the car leaked badly, and it just so happened that the car came through heavy rain storms. The entire carload of metal was snow white with this corrosion product, white rust, and the car inside was very musty and moldy. When opened to unload the metal, the inside of the car had a very moldy smell; and on unloading the slabs, much confined water was to be seen from the rain that had leaked through the roof.

These practical facts all go to illustrate that white rust is nothing more than the rusting, or oxidizing, of the metal zinc, forming corrosion products varying according to the factors and conditions.

Zinc is put on iron in the form of a galvanized coating because the zinc is electro-positive to iron and corrodes, or oxidizes, first, thus protecting the iron beneath. It is of considerable practical interest at this time to look at the chemical series

ELECTROCHEMICAL SERIES

1. Caesium	23. Nickel	45. Silicon
2. Rubidium	24. Cobalt	46. Titanium
3. Potassium	25. Thallium	47. Columbium
4. Sodium	26. Cadmium	48. Tantalum
5. Lithium	27. Lead	49. Tellurium
6. Barium	28. Germanium	50. Antimony
7. Strontium	29. Indium	51. Carbon
8. Calcium	30. Gallium	52. Boron
9. Magnesium	31. Bismuth	53. Tungsten
10. Beryllium	32. Uranium	54. Molybdenum
11. Ytterbium	33. Copper	55. Vanadium
12. Erbium	34. Silver	56. Chromium
13. Scandium	35. Mercury	57. Arsenic
14. Aluminum	36. Palladium	58. Phosphorus
15. Zirconium	37. Ruthenium	59. Selenium
16. Thorium	38. Rhodium	60. Iodine
17. Cerium	39. Platinum	61. Bromine
18. Didymium	40. Iridium	62. Chlorine
19. Lanthanum	41. Osmium	63. Fluorine
20. Manganese	42. Gold	64. Nitrogen
21. Zinc	43. Hydrogen	65. Sulphur
22. Iron	44. Tin	66. Oxygen

M ZINC-COATED PRODUCTS



and to note where both zinc and iron are. Also we may note the positions of aluminum, tin, cadmium, lead and some of the other metals found as impurities in hot-dipped zinc coatings.

The difference in the electrochemical properties of the common metals zinc, cadmium, lead, copper, nickel, aluminum and tin has been well illustrated by Rawdon. In the corrosion of steel, with small plugs of these other metals inserted, all pieces were covered with rust except the pieces containing the zinc and cadmium plugs. The forces of corrosion attack and destroy the zinc first, this fact or principle being the reason for applying zinc coatings.

In studying the conditions and factors that form white rust it is of interest to compare the mechanism with that of iron rust, or red rust. The result of the corrosion of iron and steel is rust. Therefore corrosion is rusting, since the process is continuous until the iron or steel has been completely destroyed.

The same may be said for the rusting of zinc, which forms the white oxide instead of the red oxide. The process of changing the iron from iron to rust is therefore corrosion, and the result of the action is rust. The word rust, however, has been so generally applied to iron that it is hard to consider it also a term to be used for the same process which goes on in the corrosion of zinc. The oxidation products, however, are very much the same, the main difference being that the first is iron while the second is zinc.

What Causes Rusting or Corrosion

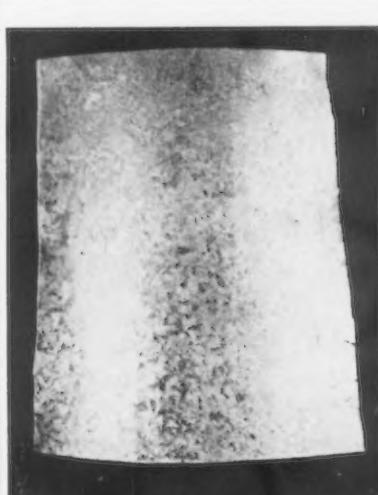
The agents of corrosion are air, which contains almost 21 per cent oxygen; water, moisture in various forms such as dampness, dew, and condensed moisture, ice, carbon dioxide, sulphur gases, chemical solutions, etc. Most common kinds of corrosion are atmospheric corrosion and that caused by dampness and moldy conditions. However, galvanized water pipes and other steel articles, buried under ground for various reasons and purposes, are subjected to different conditions. Then, again, these articles

ANALOGOUS to the air-and-moisture oxidation of steel is a similar oxidation of zinc-coated products. This white rust, made up of zinc oxide, zinc hydroxide and zinc carbonate, forms under conditions which can easily be avoided. This article points out how this form of oxidation attacks galvanized articles, and what simple means suffice for obviating trouble from this source.

are at times entirely submerged in water, or other solutions.

Causes and agents of corrosion may be classified into two distinct classes, from a logical and practical standpoint:—those which are due to the physical and chemical properties of the material itself, and those due to the effect of the actions of agents entirely independent of the material corroded.

In considering those causes within the material itself, there are such factors as the iron content of the zinc, and metallic additions that have been made to the bath, such as aluminum, tin, cadmium and antimony. Practical experience seems to indicate that tin additions in large quantities to the galvanizing bath promote the formation of white rust. Inclusions of oxide and other impurities in the zinc may also accelerate the formation of white rust.



"White Rust" formed on metalware articles

The mechanism of the formation of white rust seems to proceed through two distinct channels of corrosion. The most common is by first forming the hydroxide, which later changes to zinc oxide and carbonate. Although it is generally known that water will ionize to a very small degree, still, with both oxygen and carbon dioxide present, there will be some hydrolysis, forming the positive hydrogen ion and the negative hydroxyl ion.

Since practically all zinc coatings contain various amounts of other metals as impurities, there are conditions set up that form a corrosion cell. The source of energy is the large mass of zinc, which has the tendency to revert to a lower form. The liquid water present supplies the medium for the transfer of the ions and the formation of the new combinations, and the other metals present as impurities supply the other pole of the corrosion cell.

It is thus obvious that the beginning of the process of the corrosion of the zinc is to be found in the formation of these ions, which provide hydroxyl ions to form the insoluble zinc hydroxide. The removal of these hydroxyl ions from solution, with the transfer of the positive electric charge from the hydrogen to the zinc, completes the reaction. The hydrogen is removed also by escaping as a gas when it loses its charge to the zinc.

The process of corrosion is therefore carried out, first, by the very slight ionization of the water into hydrogen and hydroxyl ions. The cause of the starting of ionization of the water may be the force or tendency for the hydrogen ion to discharge its electric charge to the zinc. Or, putting it in another way, it may be due to the pressure or energy head of the zinc in endeavoring to revert into a

lower form. This causes the zinc to dissolve, so that it can ionize and receive the charge. As soon as it receives the charge, it immediately removes two hydroxyl ions from the solution, and the hydrogen which gave up the charge to the zinc escapes as a gas.

Operation of the Electric Charge

In this way both ions are constantly being removed from solution, and as long as there is any zinc left the action will continue. The action is kept going by the pressure, or static head, of the electric charge on the hydrogen ions in continually carrying them and discharging them on the zinc ions. Just as soon as the zinc has been exhausted the action ceases, and there remains only the tendency of the hydrogen ions (or electrical pressure, if it may be called that). The action must stop also if the water dries up, as this removes the medium through which the process operates, and ionization is stopped.

Thus the zinc, the hydrogen ion and the hydroxyl ions have all been removed from the solution, so that the action can continue. The hydroxide represents the saturation of the zinc compound with water. But with changing conditions, drying out and the loss of water, a readjustment takes place, tending to produce zinc oxide and zinc carbonate. As the water disappears entirely, and the action of oxygen and carbon dioxide become more prominent, there is a tendency to form more and more zinc oxide and carbonate, and to reduce the amount of zinc hydroxide present.

The direct cause of the formation of white rust is of special interest when studied in specific examples. In one case a great many cross-arm braces were returned, due to a heavy formation of white rust, with exposed places in the steel.

A check-up in the process showed that the cooling water had not been heated, and that the braces when taken from the water tank were entirely cold and when piled were wet with water. After being stored for a time this confined water naturally attacked and corroded the zinc coating, just as if it were iron rusting under such conditions. The remedy in this case is to see that the cooling water is hot, and that the braces are drawn out of the water with enough heat left in them to dry the braces entirely by the time they are piled.

Another typical example of the formation of white rust was found in the storage of range boilers. The floor in the warehouse of this example was made of wood, and there were large

cracks between the boards. Also, the floor was only a few feet off the ground.

In the autumn and in the early spring, when rain, cold and dampness are present, and when the moisture and dampness have a tendency to stay for long periods, these boilers developed white rust. The testing water, which was slightly acid from flux adhering to the inside or other places, accelerated or aggravated these conditions. A new brick warehouse and more careful supervision in the emptying and cleaning of the testing water was the remedy in this case.

In still another example white rust was found on galvanized water pipe stored in an open warehouse. Dampness and moisture had free access to the product, and white rust was a very annoying factor to contend with. Metallic additions to the galvanizing bath did not overcome the trouble. Finally, an entirely new plant and warehouse were built, with the result that conditions were improved, and largely overcome at the plant itself.

A typical example of white rust formed in the metalware industry is illustrated. The conditions were the drawing of the article from the open side of the galvanizing bath, dipping in a tub of hot water to test the bottom for leaks, and then immediately nesting the articles for storage. The white rust was found to cover the coating just to the depth from the bottom that the article nested in the one below it. When the articles were all nested the white rust could not be seen on the parts of the articles visible, but when the wire was broken, and the articles examined separately, a coating of white rust was found from the bottom up to the height where it nested in the article below it.

Foreign Shipments Particularly Susceptible

Other specific examples of white rust have been described in shipments of zinc-coated articles to various foreign countries. The cause here is the dampness, moisture and moldy conditions present in the hold of the ship, where the articles are packed tightly together, without the free circulation of air currents. This white rust also contains chlorides from the action of the sodium and magnesium chlorides found in sea water.

Since white rust is merely the rusting, or corrosion, of zinc, the purity of the zinc will not have much to do with it, other than perhaps to affect the speed of rusting. It is well known that, the purer any metal is, the more resistant it is to corrosion. But even

use of a pure metal is not the remedy for eliminating the condition entirely.

How to Prevent White Rust

There are two practical and logical methods to prevent white rust. The first is to eliminate as nearly as possible the conditions that make the formation of white rust possible; the second, to protect the zinc coating with some kind of air-proof and moisture-proof coating.

The first method begins right at the galvanizing kettle. One must see carefully that all work leaving the kettle is entirely dry, and reasonably warm. Also no articles either tested in water, or cooled in water, should be piled or confined immediately. The heat left in them should be given ample time to dry entirely any water or dampness present.

Particular care should also be taken that no liquid flux is left on the articles, and also that the liquid flux is kept confined to the side of the bath, where it belongs. The zinc chloride and acid in the flux are ideal for producing accelerated conditions for forming white rust, when confined with water or moisture.

Storage conditions and shipping conditions must be good. Zinc-coated products should never be shipped in a car that leaks. And in piling in the car, the work should be arranged so as to give as free an access to air as possible. The same general conditions apply to the storage of zinc-coated articles in the warehouse. The storage place should be dry and light. If piled, the product should be up off the floor on timbers, allowing free access of air underneath. Actual cases are known where galvanized ware has been in storage for ten years with only a slight dulling of the coating, and no white rust was formed on it.

Protective Covering Sometimes Used

The second proposal is to cover the coating with some material that will exclude both air and moisture from the zinc-coating. On long shipments to foreign countries the work may be greased. There are some commercial applications of materials on the market for this purpose, but just how successful they are the writer cannot say.

In some cases investigated the cost of the material is too high to warrant broad practical application in a field with such keen competition as galvanizing. In some cases a transparent varnish is baked on special kinds of high-quality galvanized coatings. But for the cheaper zinc-coated articles this method is not practical, as it increases the cost of manufacture.

The problem is, indeed, very com-

plicated when considered from both the technical and the commercial angles. From a technical standpoint it is not such a difficult matter simply to protect the galvanized coating from corrosion and the formation of white

rust. However, when the commercial angle has to be considered also, not only the increase in cost enters, but also the uncanny fact that the customer thinks that any kind of a protecting material put on it is an indica-

cation that there is something perhaps the matter with the galvanizing, and that, if he does not receive the clean, uncoated, smooth, bright zinc coating, the product is of inferior quality.

Pipe Line Welded At Speed of 17 Min. Per Joint



IN constructing the 26-in. gas transmission pipe line from Kettleman Hills to Los Angeles firing line welds were made at the rate of 22 per crew per 9-hr. day with actual welding time 17 min. per joint. This includes cleaning and brushing two beads of weld metal. The shielded arc process was used. A section of 124 miles was welded by

eight firing line crews under H. C. Price, Inc., of Bartlesville, Okla., in 112 9-hr. days.

On this Kettleman Hills line, 40-ft. lengths of pipe were strung beside the ditch. The lining up and tacking crew fitted the double bell end pipe with a backing up ring 3-in. wide and $\frac{1}{4}$ in. thick. The pipe was beveled at 25 deg.

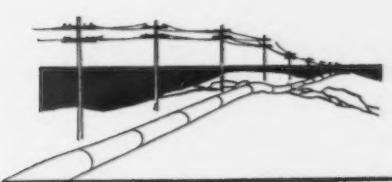
The firing line gang in eight three-men units, and with eight gasoline-engine driven Lincoln Stable Arc welders, followed the tacking crew. One helper turned the pipe and the other stood by to scale the bead. The operators used $\frac{3}{8}$ -in. Fleetweld shielded arc electrodes in the 18-in. length. Bell hole welds were made by 3/16-in. diameter Fleetweld electrodes in 45 to 60 min. time per joint. Three or more beads were used for bell-holing.

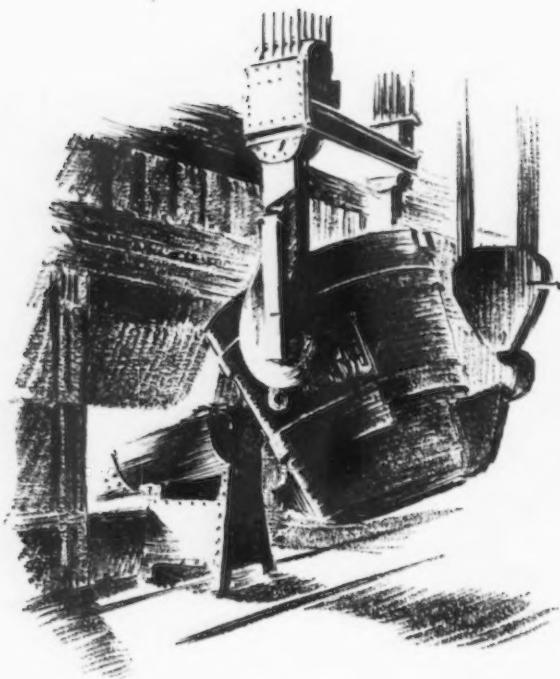
This line is entirely arc welded. Expansion joints, gates, by-passes and all fittings were fused into a single unit with the arc. Tensile and bend tests were made in the field with a portable machine, and each day's completed line was tested with 100 lb. of air pressure and soap suds.

Other high speeds set with this procedure and equipment by the same contractor include the completion in 58 calendar days of 180 miles of 10-in. pipe from East Texas to Beaumont in a line which was completely arc welded; and the welding of 120 miles of 12-in. line in 40 days. One 40-mile section was completed in 17 welding days.



Firing line units of the 26-in. Kettleman Hills gas pipe line were welded at the rate of 22 joints per 9-hr. day. Bell hole welds, such as shown in the upper illustration, were completed in less than an hour with the shielded arc process.





SYMPOSIUM ON MELTING STEEL BY DIFFERENT PROCESSES



VARIOUS authorities on different forms of steel melting presented papers before the Steel Treaters' meeting in Boston, outlining in general terms the practices of their specialties and showing how and why the work is done as it is. These papers are to form the basis for an addition to the handbook of the A. S. S. T.

These topics were discussed as follows: "Melting of Crucible Tool Steel," by Owen K. Parmiter, Firth-Sterling Steel Co., McKeesport, Pa.; "Making Acid Electric Steel for Castings," by George Batty, Steel Castings Development Bureau, Philadelphia; "Open-Hearth Process of Making Steel," by Dr. Charles H. Herty, Jr., United States Bureau of Mines, Pittsburgh; "Melting of Tool and Other High-Grade Steels in the Basic Electric Furnace," by J. P. Gill and M. R. Trembour, Vanadium Alloy Steel Co., Latrobe, Pa.; "Ingots, Ingot Molds and Castings," by George A. Dornin, Gathmann Corp., Baltimore; "Development of Italian Industry in Making Special Steels and Irons," by Dr. Federico Giolitti, Turin, Italy.

Acid Electric Steel for Castings

FOR a steel which is to finish at 0.25 per cent carbon and 0.80 per cent manganese, Mr. Batty advocates running the carbon down in the furnace to about 0.12 per cent and then bringing it back with additions. On heats where ore is to be added, the ore should be put in in small and

easily melted pieces during the central operations of the heat. If possible, additions of ore should be avoided anywhere near the end of a heat, and ore should never be put in after the addition of manganese and silicon.

Oxidation was referred to as the crux of the steel-making process. To avoid trouble from this source the author recommended adding the ferromanganese and ferrosilicon in the furnace before tapping.

As to ladle practice, cleanliness of the ladle is essential, particularly when making light and intricate castings. It is necessary to clean the ladle thoroughly after every heat, to avoid vitiating the steel maker's efforts to produce clean steel.

Haste in turning out steel was condemned. The furnace operator may be under great pressure from the foundry superintendent to get steel into the molds. For the best interests of the whole concern, however, he should not let this pressure influence him. He should tap the steel only when it is thoroughly ready.

A teapot type of ladle rather than the open lip-pour ladle was recommended. Cleaner steel was reported to be thus obtainable, as the non-metallics have a chance to rise to the surface while the steel goes through the spout from the bottom of the ladle. Furthermore, these ladles conserve heat in the steel and this is important for thin or fine castings.

Discussing the paper, Major R. A. Bull referred to the electric furnace in general as an instrument which lends itself dangerously to a high

speed of operation. For this reason he added his caution to that of the author, not to take the steel out of the furnace until it is thoroughly ready to serve its ultimate purpose.

One feature in converter steel in which he finds it superior to electric steel lies in its greater persistence of fluidity over a period of time. This is of advantage in filling a long string of small molds. The difference was laid to the greater percentage of oxides contained in the converter metal.

One must distinguish, the speaker said, between silicon remaining in the metal through the reduction process and that coming from additions made after the metal has been pretty well cleared. The latter is much the better case.

Major Bull expressed a preference for a bottom-pour ladle rather than the teapot type, as being best in avoiding deleterious inclusions. In practice, however, this type is difficult to use for small molds, because of the slop and spill which seem to be inevitable. With the teapot type, however, it is difficult to maintain a clean condition in the spout lining and particularly at the entrance of the spout from the bottom of the ladle.

Melting of Crucible Tool Steel

IN general, the crucible process produces six heats of steel in 24 hr., or 33 heats a week. A furnace consists usually in a melting unit using gas in some form as a fuel, and having five chambers in which 30 pots of

materials are melted and formed into steel. In such a furnace there are six pots in each chamber.

This is not a process of great refinement, as sulphur and phosphorus cannot be removed by the operation. For this reason the best materials have to be selected for the charge.

Melting takes place in $2\frac{3}{4}$ to 3 hr., after which about 1 hr. is devoted to killing or dead melting, thus giving the material a soaking heat. This molten steel under these conditions absorbs both carbon and silica from the pot. Pots average about six heats.

Discussing the Parmiter paper, A. H. Lansbury, of William Jessup & Sons, defended the crucible process as being the only practical means we have by which steel can be made efficiently in small quantities. He spoke of a great change for the better in the efficiency of production, whereby the amount of coke used for melting a ton of steel had been reduced from $3\frac{1}{2}$ or 4 tons some years ago to perhaps 2 or $2\frac{1}{2}$ tons now. Clay pots or crucibles are much cheaper than those of graphite. Furthermore, the clay has no carbon to go into the steel during the process. On the other hand, clay pots are very fragile. They cannot be allowed to cool down between heats and their life, therefore, is usually only one or two heats.

Open-Hearth Process of Making Steel

TWO main causes for the large use of the basic open-hearth process in steel making were referred to by Dr. Herty as being the possibility to eliminate phosphorus and some of the sulphur, and the ability to make large tonnage very cheaply. This latter ability is possessed also by the acid furnace, but that type does not lend itself to elimination of phosphorus or sulphur.

Three general types of operation of basic open-hearth furnaces were referred to. In the first, where the charge is about 60 per cent scrap and 40 per cent pig metal, either hot or cold, the melted bath has about 0.80 per cent carbon. This figure is pretty well controllable by the melter, through balancing his scrap and the metal to suit the condition aimed at.

A second charge would contain considerable quantities of ore for the purpose of melting lower than the other raw ingredients would give. This method is employed largely when pig iron is relatively cheap and consequently would naturally, from the economic standpoint, form a larger proportion of the charge. Such a

charge is difficult to control in the furnace, and is not so likely to result in a good steel.

A third process involves the use of duplex metal from a Bessemer converter together with molten pig iron from the mixer, tapping the heat from a huge furnace running up to 300 tons or more in some cases, and providing one, two, three or four ladies or heats of metal from the same bath. This method of operation was referred to as special and not general.

Discussion of this subject was started by R. C. Good, metallurgist, Electro Metallurgical Sales Corp., Pittsburgh. He referred to the whole operation as a complex matter in which the melter, by reason of his skill acquired through long years of arduous endeavor, can obtain pretty much what he wants out of his furnace, if he is not handicapped through poor raw materials or other hindrances. The open-hearth furnace is an instrument in which, through the preheating of air to about 1000 deg. C., the flame temperature can be increased by from 400 to 600 deg. C., according to the character of the fuel. This speaker made a plea for close cooperation between the producers and the users of ferroalloys, as a means to obtaining a product which will be most satisfactory in service.

Dr. Herty said that a killed low-carbon steel would be ideal for deep-drawing if only one knew how to make it properly. Failing this, we make a rimming steel for this purpose in spite of its relatively low yield in finished product, because we can locate the segregation in a rimming steel where we want it and thus get the surface demanded.

In a written discussion, George A. Dornin, Gathmann Co., Baltimore, referred to the basic open-hearth practice as distinctly weak in the matter of deoxidation. A clean low-carbon deoxidized steel is very difficult and costly to make in a basic open-hearth furnace. Rimmed ingots have to be made large, because of the segrega-

tion and the porous interior. It becomes necessary in this case to weld up the numerous blowholes through adequate working. The speaker considers rimmed steel as of no value where the material has to stand a considerable stress. Where, however, the stress is not great, and a fine surface is required, that type of steel can be used to advantage.

Ingots, Ingot Molds and Castings

THE paper by Mr. Dornin was devoted largely to ingots. Steel which is of fairly uniform composition molten loses some of this uniformity in solidifying. Its skin may have weaknesses which may develop into a seam, which results in the expensive chipping of billets. Losses from this source in an average year are estimated by the author at \$100,000,000, with a similar estimate of losses from pipe and piping in steel ingots, making a total of \$200,000,000, which, Mr. Dornin stated, is half the net earnings of all the steel companies in a reasonably good year.

Ingot molds are customarily made of cast iron. As the steel rises in the mold it has a temperature of perhaps 1550 deg. C., against the mold's temperature of 50 deg. or so. The steel freezes at its surface in contact with the mold, but the temperature between the two materials, ingot and mold, is for various reasons not a mean between the initial temperatures of the two materials as mentioned above. At the end of pouring an ingot, the interface in contact may have a temperature around 900 to 910 deg. C.

A recommendation was made that steel be poured into molds as cold as they can be used without danger of cracking them. This idea is predicated upon the fact that the temperature of a mold already hot may be raised enough by the incoming steel to bring it near the melting point of the mold material. This would contaminate the steel and destroy the mold's usefulness.

An air gap appears between mold and ingot skin shortly after the steel freezes. This arises from two sources—the expansion of the mold as it heats up, and the contraction of the ingot as it solidifies. The heat conductivity of the iron is greater than the conductivity of the iron oxide forming at the surface, and both are much greater than that of the air gap forming between mold and ingot. Heavy mold walls are used not, as is generally supposed, because they have a greater absorptive capacity for heat, but because this will result in



a lower average mold temperature, a smaller consequent expansion in the mold and finally a thinner air gap.

An air gap is found to form more rapidly on a round ingot of say 18-in. diameter than on a square or rectangular section of the same cross-sectional area; and a corrugated ingot mold results in still slower formation of this air gap.

On the skin of the ingot as it is formed the first crystals are very fine and close grained. If separation occurs too soon between ingot and mold, the skin of the ingot may not be strong enough to withstand the internal ferrostatic pressure. In this case the ingot skin will crack and the ingot will bleed from the interior. For this reason large ingots are rarely made of circular cross-sections, but almost always in corrugated molds.

Practice has resulted in great variation in the taper of ingot molds, and consequently of the ingots cast in them. There is no general rule for molds cast with the big end up, as the taper varies so greatly according to the size and the character of the product. One case mentioned as perhaps typical is a 3-in. taper on an ingot 65 in. long.

Molds with the big end down have gone as high as a 2-in. taper for a 3-ton mold. Practice at present is less than this, running in some cases as low as $\frac{1}{2}$ in.

Shrinkage of steel in volume between molten condition and cold was reported to be about 4 per cent of its total molten volume. With rimming steel this may be much greater, because of the evolution and elimination of gases from the interior. Rimming steel blowholes may weld up after a fashion, but such a weld is never an equal to the original crystals.

Practice differs with regard to the relation of the mold weight to ingot weight. Customarily this is about one to one, where the ingot is cast big end down, whereas with big end up the mold may weigh 50 per cent more than the ingot.

Corner radii of ingots should be roughly proportional to the size of the ingot itself. As an example, a 3-in. radius is satisfactory for a 20-in. square ingot. Too small a radius is likely to have the corners burned, while with too large a radius there may be cracking. Up to 20 in. diameter an octagonal section is satisfactory; above that it should be corrugated. The corrugations should have the larger radius on the surface where the mold bellies into the ingot space, and the smaller radius where these two are joined.

Segregation is usually worst in carbon and sulphur. With phosphorus it is relatively slight. Most ingots, in the author's opinion, are made altogether too large, because of convenience in mill operations and open-hearth practice. A reduction of three-to-one in rolling or forging gives proper work refining of the steel grain.

Pouring Ingots Too Fast

We pour our ingots too fast. Frequently no more than 40 sec. is allowed to a mold. In the author's opinion the filling time for 3-ton molds should be about 5 min. and 6 min. for 5-ton molds.

Avoidance of deoxidation in the mold was recommended. Where this cannot be avoided, he recommended putting as much of the deoxidizer into the ladle and as little as possible into the mold. If it must be put into the mold it should be so done that the deoxidizer will be thoroughly mixed with the steel by the nozzle stream.

In discussing this paper R. H. Ashdown, Westinghouse Electric & Mfg. Co., referred to stickers as coming mostly from penetration of liquid steel into the spongy portions in the mold surface. Speaking from his experience in England, he disagreed with Mr. Dornin regarding ability to cast large ingots of circular cross-section. He spoke of having superintended the casting of some thousands of tons of round ingots up to 60 in. diameter and 100,000 lb. in weight, without having difficulty.

Corrugated molds, he stated, because of their large contact surface between ingot and mold and a corresponding large radiating surface for heat, speed up the operation of solidification of the ingot. To this extent they retard segregation in the steel.

Melting Tool Steels in Basic Electric Furnaces

Of the various electric furnaces of some years ago used for making tool and high-grade steels, only the Heroult has stood the test of

time in its appointed field, according to the paper by Mr. Gill. Raw materials for such a furnace are so selected that they will melt lower in metalloids than is desired in the steel.

If the scrap is too loose and light in character, the automatic feeding of the electrodes in melting it will go right down through the charge. Frequently, with an insufficient pool of molten metal at the bottom of the furnace, the intense heat from the electric arc will burn through the furnace bottom. If, on the other hand, the charge consists of too dense a mass of material, it will take too long to melt it and the roof of the furnace is likely to suffer.

For melting down, a high voltage and quick melt are general for economical operation and low furnace losses. For removal of oxides formed in the slag or added to the slag a deoxidation of the metal should be accomplished by means of finely divided coal or coke, or finely crushed calcium carbide or ferro-silicon. In desulphurization there is a reaction with the lime, forming calcium sulphide. Through chemical tests the melter knows what to add and how and when to do it. Mainly alloys are used to get the desired final composition.

Discussing this matter, W. H. Wills, Ludlum Steel Co., Dunkirk, N. Y., spoke of the matter of charging electric furnaces. Hand charging is employed on the smaller units; the roof is removed in some instances and the charge put in by bucket or otherwise. As the furnace gets larger, however, removal of the roof results in too much loss of heat. For all furnaces above six tons mechanical charging gives most satisfactory results.

Whether to Make a Two-Slag Heat

A difference of opinion arose between Mr. Gill and A. J. Scheidt of the Columbia Tool Steel Co., Chicago Heights, Ill., with regard to the matter of flushing off the initial slag and making a two-slag heat. Mr. Scheidt favors this method wherever it is possible to use it. It results, he says, in a steel lower in phosphorus and sulphur and gives better control of silicon. The second slag can be shaped up quickly.

Mr. Gill made the point that if there is much high-speed steel scrap in the charge the two-slag heat results in a terrific loss of valuable elements from this portion of the charge. It appears from Mr. Scheidt's rebuttal, however, that he did not have high-speed steel in mind as a charge when making the two-slag heat.



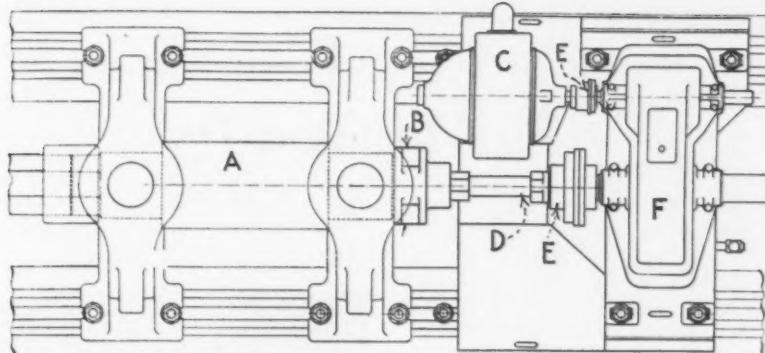
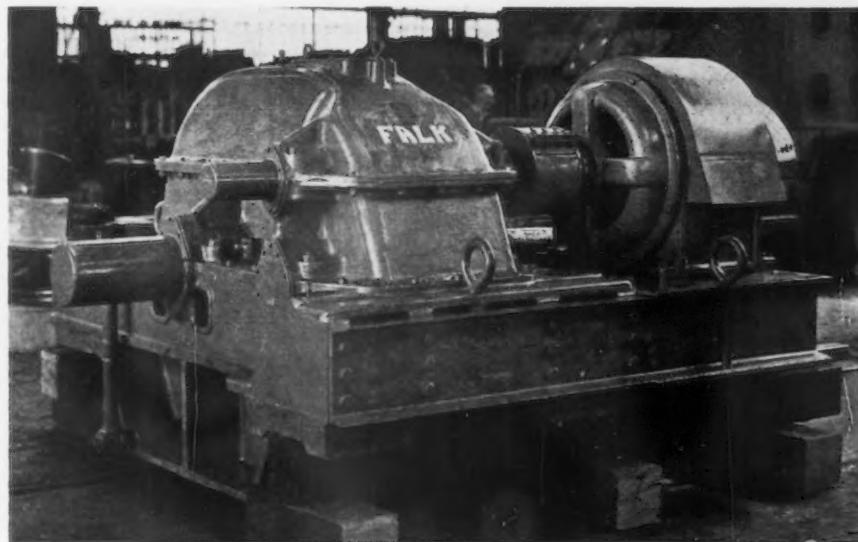
Electric Regenerative Drag for Sheet Mills Eliminates Power Loss

To eliminate the power loss entailed by the friction drags used to prevent backlash in sheet mills, a new installation in the Detroit district combines regeneration of electric power with production of a dragging torque. This equipment, designed by the Freyn Engineering Co., Chicago, comprises a generator and gear unit mounted on a common bedplate arranged to be mounted on the

ance in series with the wound rotor of the generator. This is done automatically by means of a control panel consisting of a primary contactor and

frequency of the generator are determined by this power supply, synchronizing the generator is not required. Interlocking is provided which prevents the generator from being paralleled with the power supply until the mill drive motor is nearly up to speed, and for automatically disconnecting the generator when the mill motor is shut down.

COMPACTNESS is a feature of this regenerative drag unit. In the diagram, **A** is the lower roll of the mill, **B** a coupling, **C** the generator, **D** the spindle, **E** and **E** flexible couplings and **F** the gear set. Adjustment may be made to provide a dragging torque just enough to avoid backlash in the mill.



shoe plates supporting the roll housings. The low-speed end of the gear unit here shown is connected to the driven roll at the end of the roll train by means of a special spindle and flexible coupling. The gear unit steps the speed up from 29 r.p.m. to 860 r.p.m. for driving the generator.

The generator is an 80-kw., 720-r.p.m. synchronous speed, wound-rotor induction machine, with power output controlled by means of a secondary resistance. The generator is operated at from 5 to 23 per cent above synchronous speed, depending upon the speed of the main-drive motor, the latter varying according to the mill load.

Constant output is obtained from the generator by varying the resist-

secondary contactors and notch-back relays.

The bedplate carrying generator and gear unit is handled as a single unit, and fits into the space occupied by the old-type friction drag. It is coupled to the mill in the same manner as the friction drag.

Starting this equipment is simple. The mill drive is started in the usual manner and, as soon as the drive is approximately up to speed, a push button is pressed which causes the primary or stator of the induction generator to be connected to the power supply, in this case the 220-volt, 60-cycle mill auxiliary power supply.

As an induction generator is excited by the power supply to which it is connected, and the voltage and

In operation, the electric regenerative drag produces a dragging torque which effectively prevents backlash. The mill on which this drag is used produces high-grade, full-finished automobile sheets on which roll marks are under no circumstances permitted. The dragging torque of the generator can be adjusted so as to be just sufficient to prevent backlash in the mills. The power input to the drag, as required by this particular mill, is approximately 95 kw., while the power output of the generator is 75 kw.

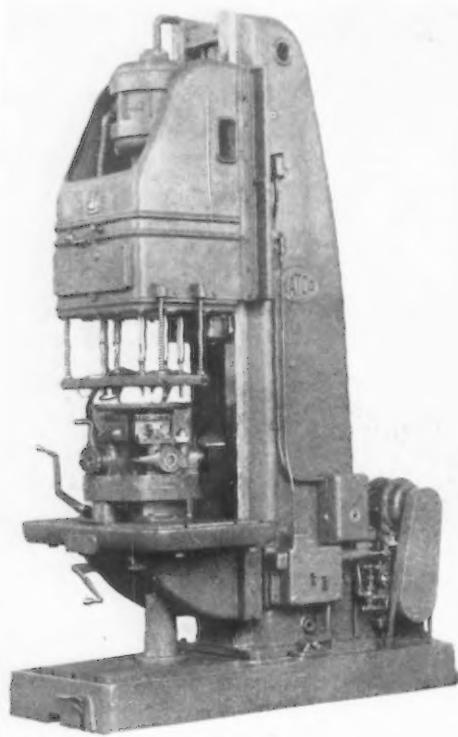
Compressed Gas Makers Plan Meeting

Discussion of technical papers will feature the first day's sessions of the annual meeting of the Compressed Gas Manufacturers Association, which will be held at the Hotel New Yorker, New York, Jan. 25 and 26.

Officers will be elected at the annual business meeting on Jan. 26, and a series of papers relating to the I. C. C. pressure vessels is planned for the afternoon of that day. C. E. MacQuigg, J. J. Crowe and Franz Eder will be among the speakers. F. R. Fetherston, 110 West Fortieth Street, New York, is secretary of the association.

New Driller Combines Increased Production and Flexibility

INCREASED production and lower operating costs are claimed for the new B-14-H NATCO hydraulic drilling machine designed by the National



Automatic Tool Co., Richmond, Ind., especially for fixed-center multiple drilling. Construction that facilitates changing the various cluster boxes to suit each individual job is a feature intended to give unusual flexibility for this type of machine and to permit a wide range of work.

Oil pressure at 1000 lb. is supplied by an Oilgear pump for hydraulic feed and rapid traverse. This pump is a high pressure plunger volumetric type using a slightly modified control valve and driven by a 3-hp. motor. The feed cylinder is set into a recess at the front of the column, directly back of the head slide. Control is centralized, the machine being operated by a single foot treadle, leaving the operator's hands free to handle the work. To start the machine, the foot treadle is depressed, but the travel of the head and the automatic working cycle do not start until the treadle has been released. This provision makes it impossible for the operator to start the machine in rapid traverse forward, jumping the feed dogs and entering the work at rapid speed; depressing the foot treadle merely serves to load the trip mechanism.

The automatic cycle, mentioned above, is timed by adjustable trip dogs

and includes rapid traverse down, feed, reverse and stop. In case of emergency at any point during the cycle, the forward motion of the head can be stopped by simply depressing the treadle a second time. This causes the head instantly to reverse its direction, return to the starting position and stop. The adjustable trip dogs for setting the length and position of the feeds are held in T-slots at the rear of the slide. Adjustment of feeding rates is by means of a calibrated device on the pump itself. For set-up purposes, the slide can be inched into position by means of a shut-off valve in the pressure line at the side of the column. All working parts of the trip mechanism are made of high grade alloy steel, heat treated to resist wear.

Drive to the spindles is from the company's standard motor housing which is mounted on the upper part of the slide, allowing space on the lower part of the slide for mounting the cluster boxes. The slide itself is of large

area and traverses on ways which are 18 in. wide and 1 1/4 in. thick. They have a bearing surface of 3 1/2 in. on each side and are provided with adjustable gibs for taking up wear. Slide counterweights are provided within the large box-type column; openings at the rear of the column permit addition or removal of auxiliary counterweights as required by the slide equipment used.

Minimum height of the working surface is 22 in. above the floor line. The knee type table can be moved through a vertical adjustment of 17 1/4 in. by means of a removable crank at the front of the knee. Area of working surface is 23 in. front to back, 40 in. left to right. The table knee has long bearings on the column ways and is provided with an adjustable gib. The base of the machine, of gridiron T-section construction, has a 22 x 32-in. finished working surface provided with T-slots to facilitate clamping box tables or fixtures when the adjustable table is not used.

The coolant system, which is furnished on special order, includes a 10-gal. gusher type pump with direct-connected motor equipped with a special switch that stops the coolant pump when the machine is shut down. All motors are started and stopped through a master push button station built into the table at the front of the machine.

Variable-Speed Transmission, Vertical Inclosed Type

THE variable-speed vertical inclosed transmission shown in the illustration is being announced by the Reeves Pulley Co., Columbus, Ind., as completing its line of improved transmissions. Offered in 10 sizes, covering speed ratios from 2:1 to 8:1 inclusive, the new design is especially suitable for certain standard equipment installations and for installations where floor space is limited.

Side cover and lid can be removed to give access to the operation parts which can be taken out of the housing as a unit if desired. Motor rails which do not obstruct removal of the lid of the cover section are provided with slotted cross rails for any type of motor of suitable power. For increased speed reduction, an auxiliary countershaft can be installed. The motor rails and motor can be mounted in connection with a pivoting motor base or on the side of the transmission. Electric remote control, electric or mechanical automatic control can be used.

Complete lubrication is possible without removing the cover section. All radial, shaft and thrust bearings are reached through force-feed fittings located in two convenient exterior panels. Shafts, driving keys and

disk hubs are lubricated by means of force fittings in each end of the shaft extensions.



Burnishes Bevel Pinions in One Operation

ALL types of bevel pinions can be burnished in the machine here shown, which was developed by the Wicaco Machine Corp., Stenton Avenue and Louden Street, Philadelphia.

Burnishing is done by three master gears which rotate in engagement with the pinion placed between them. As the axes of the master gears and the pinion intersect at one point, the latter finds its natural running position. One of the master gears is belt-driven from a countershaft and can be rotated in either direction. The other two master gears are mounted on spindles within micrometer sleeves and also conical eccentric sleeves. A hand lever on one of the eccentric sleeves permits the master gears to be rolled about the common apex.

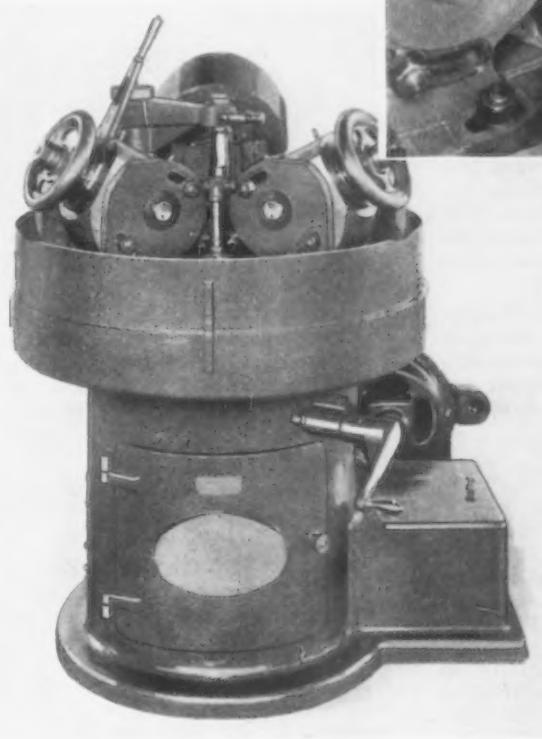
This construction permits uniform tooth pressure to be imparted to all three master gears and to the pinion being burnished; the pressure is in line with the common apex point of the four gears. The result is a swaging effect that tends to close open pores of the metal grain and to produce a hard glazed surface on the tooth profile. Fine adjustment to and from the apex point is provided by the bronze micrometer sleeves.

All three heads are assembled in a trunnion bracket; the two heads which hold the driven master gears have flywheels at the rear to balance the heads on their shafts. The heads can be set to the angular positions required for pinions of different gear ratios. Angular verniers permit accurate settings.

The slight upward thrust of the pinion is taken by a micrometer stop on the overhead support arm. Since

the pinion to be burnished is both driven and driving, the greatest part of the spiral thrust is counteracted.

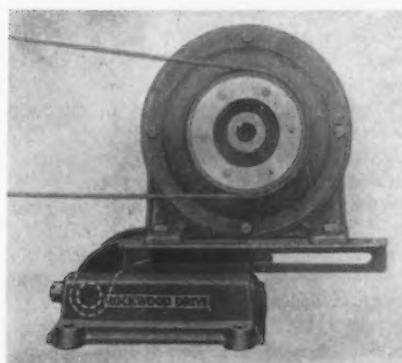
The machine is of heavy, rigid construction, and weighs approximately 3340 lb. Its purpose is to burnish and lap pinion gears in one operation, resulting in a smooth finish, the entire operation consuming about 1 min., floor-to-floor time.



THREE master gears, one driving and two driven, perform the burnishing operation. Close-up above shows a spiral-bevel pinion in position for burnishing.

Improved Rockwood Drives

IMPROVEMENTS in the pivoted motor-base for short-center flat-belt drives brought out by the Rock-



wood Mfg. Co., Indianapolis, and announced in THE IRON AGE of March 26, 1931, include adjustable arms that adapt the bases for all types of motors and generators. Formerly the bases were available in standard units for polyphase induction motors only. In addition, the list of sizes has been increased so that stock drives from 1 to 100 hp. are now available.

Correct belt tension can now be established by test or by mathematical check when the drive is installed; the adjustable arms permit the motor to be moved toward or away from the pivot shaft of the base so as to utilize the proper portion of the motor's weight that the installation requires. By adjusting the arms for the least possible belt tension required to pull the load, minimum bearing pressure is obtained and power consumption is reduced. The accompanying illustra-

tion shows the motor in position for comparatively heavy loads; by moving the motor to the left, or more nearly over the pivot, the belt tension is reduced.

Feedwater Valve Signal Device

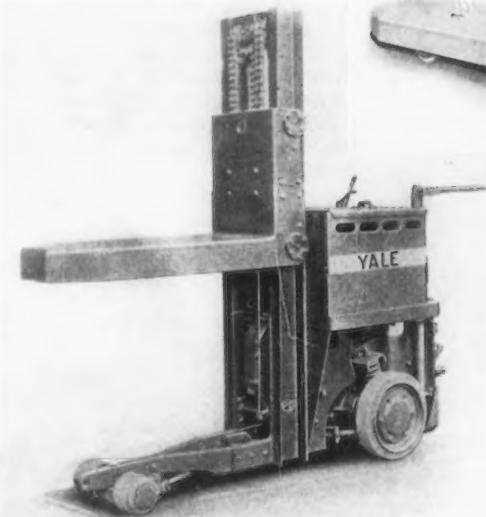
A NEW electric signal device brought out by the Northern Equipment Co., Erie, Pa., for use with the control valve on the Copes feed water regulator, gives instant warning of any abnormal condition in the boiler feed supply by operating an electric bell or light signal if the valve should reach the wide-open or fully-closed positions.

Midget Lift Trucks Operate In Close Quarters

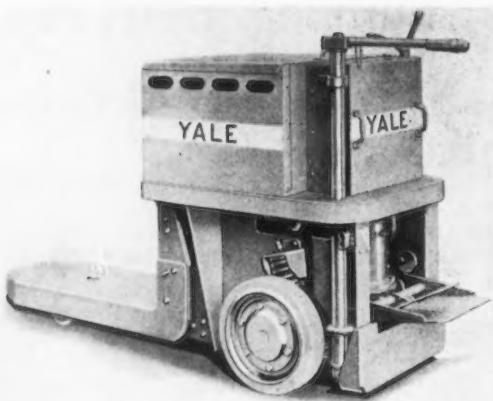
THE low lift and high lift midget trucks here illustrated are offered in 3000 lb. capacity by the Yale & Towne Mfg. Co., Philadelphia, and designated as models KM3L and KM3H. Other models of this series include low and high lift, 4000-lb. capacity trucks having six-wheel steer, also high and low platform carrying types, as well as high lift fork trucks.

Light weight in comparison with the capacity ratings makes these trucks particularly suitable for operation where floor or elevator capacities are limited. Overall width is 29 in. and overall length of the low and high lift trucks, with a standard load platform 42 in. long and with the operator's platform folded up, is approximately 80 in. These dimensions make service possible in narrow aisles and over small elevators.

Double reduction, drop forged alloy-steel spur gears are used in the main drive unit; elevating platforms are raised and lowered by two independent roller chains and sprockets driven by



a triple reduction of drop forged alloy-steel spur gears. The main drive controller has four speeds in either



direction, giving smooth, easy starting. Interlock of the controller with the driving brake requires the operator to return the controller handle to neutral after releasing the brake before driving power can again be applied. The load platform can be started or stopped at any desired height. Top and bottom limit stops automatically cut off the power and apply the brake when the platform reaches the maximum position in either direction.

Unit-Built Motors and Speed Reducers

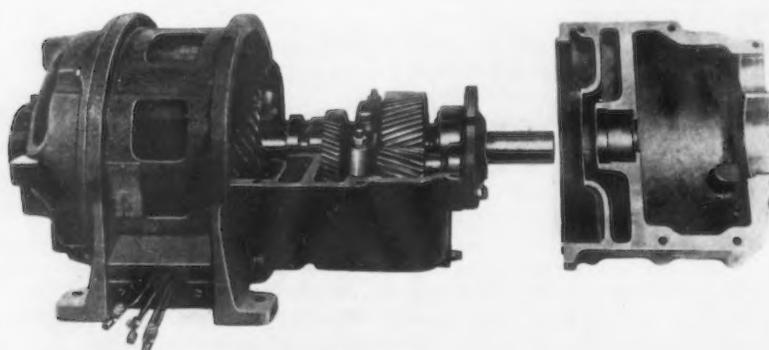
COMPACT and efficient driving at reduced motor speeds is afforded by new self-contained motor and speed reducer units brought out by the Westinghouse Electric & Mfg. Co., Nuttall works, Pittsburgh. These new drives, termed Gearmotors, are only a few inches longer overall than motors alone. Advantages claimed include economy in space requirements, simplified installation, reduced number of drive parts, high efficiency of operation, and assured low maintenance requirements.

Each unit includes a Westinghouse type CS general purpose induction motor and a double reduction, non-planetary type helical gear speed reducer built onto the one-piece motor frame and forming a rigid assembly which is supported entirely by the motor feet. An improvement in motor construction incorporated in these unit drives is the pre-wound primary core which is separable from the stator frame. This feature makes for economies in motor operation and maintenance, reduces repair parts stocks and also facilitates change of motor speed, voltage, and phase. Practically indestructible rotor, dual treated windings, directed ventilation, and

ball bearings are other motor features. The simple speed-reducing mechanism is fully inclosed in a two-piece housing which is rigidly bolted to the motor frame.

Heat treatment of the helical gears and pinions by the BP "tough-hard" process makes this gearing highly resistant to wear and shock loads. All gear and pinion shafts are supported on roller bearings. Lubrication of one motor bearing and all moving parts of the speed reducing mechanism is by a simple and effective splash system, the lower section of the housing forming a reservoir for the lubricant. The other motor bearing is packed with grease. Seals on all shafts prevent oil escapement into the motor windings and to the outside of the unit at shaft apertures.

Access to Gearmotor parts is obtained by removing the top section of the housing without removing the drive from its mounting or uncoupling it from the driven equipment. Removing the motor bearing bracket permits pulling out the complete rotor assembly including oil seal, bearing and pinion on the shaft. Gearmotors are built in sizes of $\frac{1}{2}$ to 15 hp., with a wide selection of output speeds ranging from 69 to 1550 r.p.m. A change in the output of any unit can readily be made at a small percentage of the initial cost.

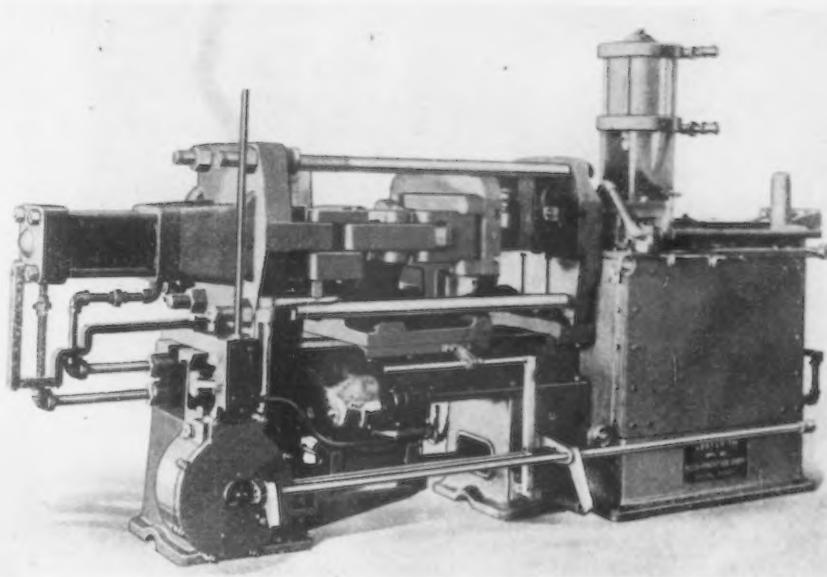


Pressure Type Die Casting Machine

FOR manufacturing die castings of zinc base alloys under the pressure method a new die casting machine of the plunger or pressure type has been developed by the Lester Die & Machine Co., Cleveland. Various advantages are claimed for the pressure type over the air type machines because of the higher pressure at which the former may be operated and the control of the machine to produce any desired pressure. This machine is designed for standard pressure of 1400 lb., but this may be varied by the control of the air cylinder. The standard plunger size is 3 1/2 in. diameter, with a maximum displacement of 10 lb. of metal. The casting temperature is 800 deg. Fahr.

Castings made on this machine are said to be free from porosity, of increased strength and to have an unusually smooth finish. Surfaces produced lend themselves readily to plating.

A feature of the machine is that it



has full automatic control with a speed range of 150 to 450 castings per hour. This machine also may be furnished with semi-automatic control.

Designated as the Lester series H machine, it is manufactured and marketed by the Reed-Prentice Corp., Worcester, Mass., in five sizes.

Portable Hardness Tester Employs Brinell Principle

A NEW hardness tester, termed the Dwarf Brinell Press and based on the Brinell principle is being introduced to the American market by the R. Y. Ferner Co., Investment Building, Washington. The instrument is portable and can be used in connection with any drill press, arbor press, vise, heavy C-clamp or other means of applying pressure that may be available. It consists of a heavy piece of steel about 7 1/4-in. long, 7/8-in. thick, 1 1/8-in. wide at one end and

tapering to a width of 3/4 in. at the other end. This piece is slit by a saw-cut in a horizontal plane from the smaller end to within about 3/4 in. from the larger end, thus forming a heavy two-pronged spring.

Near the end of the slit, on the under side, there is a holder for the 5-mm. steel ball, while opposite this

hole has a flat ring around it and normally, when no load is applied, the end of the pin is about 1 mm. below the surface of this ring.

When the pressure is applied the operator grasps the smaller end of the instrument in such a way as to hold his thumb or a finger over the surface of the ring; when he feels the end of the pin to be flush with the surface of the ring, the full pressure of 750 kg. has been reached. It is stated that this position of the pin can be judged accurately within 0.01 mm., or 1 per cent of the applied load.

Pressure is released after the usual 30-sec. period and the impression measured by means of a magnifying glass and rotating scale reading directly in Brinell numbers and tensile strength, the latter being for steel only.

In making this measurement the beveled edge reference mark on the base of the scale is set at the edge of the indentation and the scale rotated until its rim, which forms an evolute curve, is adjacent to the opposite edge of the indentation. The correct scale reading is then indicated by an index line.

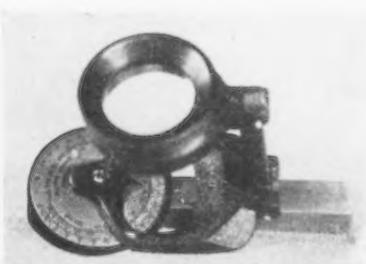
holder, on the upper prong, there is a knurled knob to which the pressure is applied. In making a test the instrument is held with the ball point against the piece to be tested. The pressure used is only 750 kg.

The method of determining the pressure—by the sense of touch—is a feature. A 5/16-in. pin at the small end of the lower prong of the instrument extends through a hole in the upper prong. The upper end of this

holder, on the upper prong, there is a knurled knob to which the pressure is applied. In making a test the instrument is held with the ball point against the piece to be tested. The pressure used is only 750 kg.

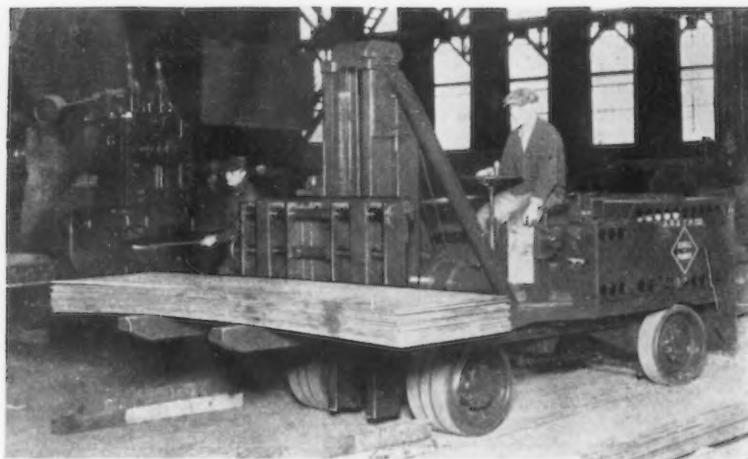
The entire outfit is contained in a wooden box 8 1/2 in. long and weighs 3 lb. 9 oz.

MAGNIFYING scale (right), for gaging the indentation, reads directly in Brinell numbers.



BALL holder and pressure gage above can be used on any press, vise or heavy clamp.





Side Shifter on New Tiering Trucks Facilitates Stacking of Sheets

FOR handling sheet steel, steel plates and coiled strip in a steel mill, a fork-type tiering truck has been brought out by the Elwell-Parker Electric Co., Cleveland. It has a capacity of 10,000 lb. The lifting device on this truck consists of two forks 38 in. long. A unique new feature is an adjustable shifting device on the fork carriage with which the load may be shifted sideways 4 in. to facilitate in the piling of steel. This side movement is effected by a motor operated rack and pinion.

The truck, with its load placed on the forks crossways, is driven to a position in front of a pile of similar stock on which it is to be piled. However, it is quite difficult to spot the truck with its load in line with the pile. With the side adjustment of the truck carriage, however, the load may be spotted in the exact position required so that the sides of the piled sheets will be perfectly straight.

Spacing of the forks is adjustable, allowing them to be set 16 to 40 in. apart, depending on the width of the material that is to be handled. This adjustment is effected by a conveniently located handwheel. The feature is also of advantage in handling coils of strip of various sizes ranging from 24 to 60 in. in diameter, the coils being placed lengthwise on the forks.

The forks are readily interchangeable for a 5 ft. ram for handling coiled material, the ram being raised and lowered by the same mechanism as the forks.

The company's standard power equipment is used, but with a new combination. The travel motor is of the worm drive type with alloy-steel differential and drive shafts. The hoist mechanism, which gives a lift of 4 ft., is operated by worm and bevel gears, and the side shifting device is driven by worm and spur gearing. Power is supplied by a 20-kw., 24-cell battery. The drive axle is next to the

load so that traction may be obtained under all conditions. The truck is 14½ ft. long and will turn in a small space. All operations can be controlled from the operator's seat in front of the battery.

THE forks of this tiering truck have a sideways movement of 4 in., enabling sheets to be stacked in even piles. Hoist and side shift motors are shown in illustration below.

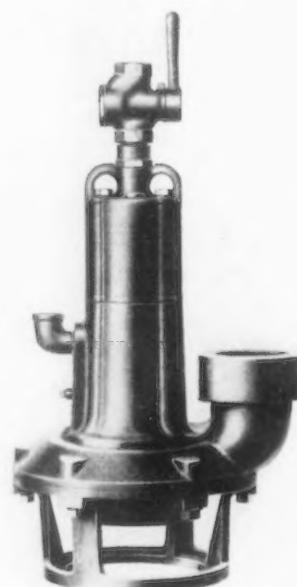


Air-Driven Centrifugal Sump Pump

A NEW centrifugal sump pump for general work requiring fast expulsion of water, oil and other liquids has been placed on the market by the

plied by the Deming Pump Co., Salem, Ohio. The outfit is portable and operates when either partially or entirely submerged. It weighs 36 lb.

With a 20-ft. head, capacity is 142 gal. per min. at 90 lb. air pressure and 137 gal. per min. at 80 lb. air pressure. Discharge is through a 2½-in. standard pipe thread outlet; the air inlet has a ½-in. standard pipe thread. Lubrication is by a patented "oil control" system from a reservoir located in the cylinder body.



Cleveland Pneumatic Tool Co., Cleveland. Designated as type C-D, it is driven by an air-motor made by this company, the pump unit being sup-

Refractory Protected Mercury Switch

REFRACTORY protected mercury switches placed on the market by the Westinghouse Lamp Co., East Pittsburgh, Pa., embody features of interest to equipment manufacturers. To protect the glass walls of this switch a refractory block is placed within the switch, providing a chamber to confine the arc caused by the opening and closing of circuits having surge characteristics. The protecting chamber is designed to assure a positive, safe and dependable impact contact between two pools of chemically pure mercury. Other features include ease of installation and operation requiring comparatively small amounts of energy. Temperature regulators, motor controls, sign flashers, etc., are listed among the possible applications.

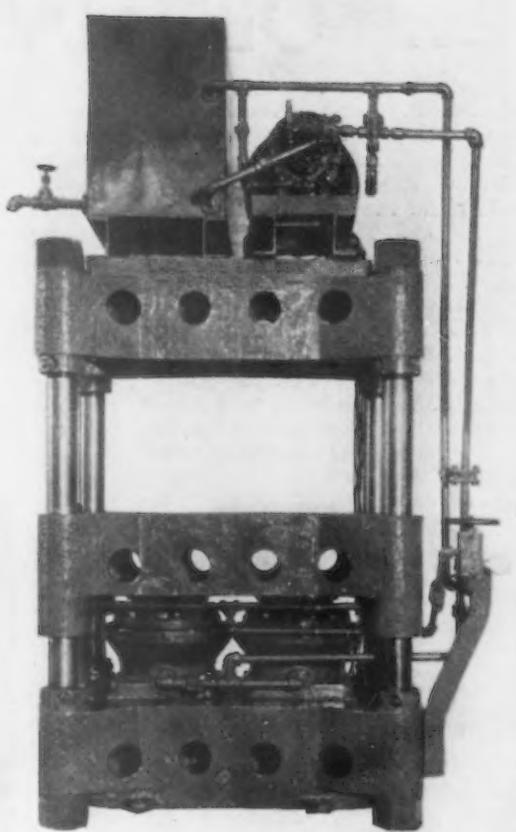
Large Composition-Molding Press with Moving Platen



THE large press illustrated was designed by the Lake Erie Engineering Corp., Buffalo, for use in molding Bakelite and similar compositions. Of the two-cylinder, moving-up type, it is equipped with a self-contained power unit, the motor and two-stage rotary pump being mounted at the top of the press. Rapid closing of the molds is actuated by the low-pressure stage; the high pressure is applied automatically for the final squeeze.

Pullbacks are provided to assure positive return of the moving platen and to actuate the strippers. Control is by means of a simple single-stem four-way valve of special design; its simplicity is emphasized as being an important feature of the press. No accumulator is required and the large tonnages employed can be regulated to accommodate a wide range of work.

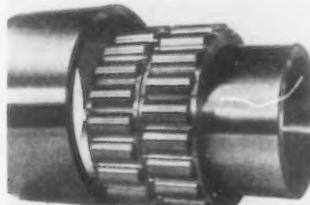
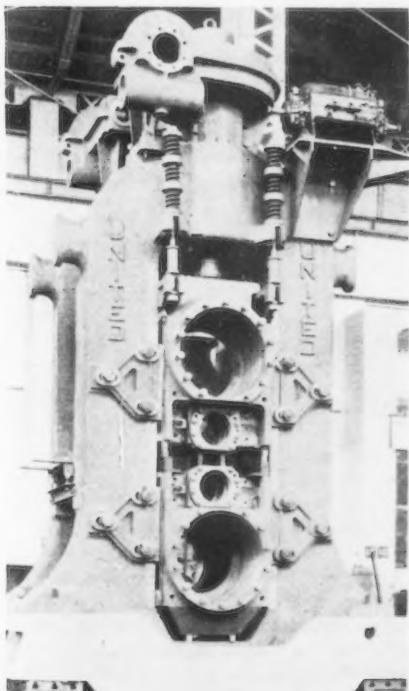
A TWO-STAGE rotary pump supplies low pressure for rapid closing and high pressure for the final squeeze. No accumulator is required.



Strip Mill Equipped With Roller Bearings

A NEW tandem, four-high mill to be used for cold rolling stainless steel strips has been built by the

United Engineering & Foundry Co., Pittsburgh. All of the working roll bearings and backing roll bearings for the mill were supplied by the Bantam Ball Bearing Co., South Bend, Ind. The backing roll bearings have



BEARING rollers are held in alignment by one-piece cast-bronze cages, said to be more rigid than the usual riveted cage.

outside diameters of $28\frac{3}{4}$ in. and are $12\frac{1}{4}$ in. long. The bearings are on the roll necks of the working rolls and backing rolls where pressures far exceed customary loads on shaft bearings for heavy-duty machinery in commercial service. Cage construction is a feature, the cage being cast in one piece of bronze and therefore, it is claimed, has greater rigidity and strength than the usual riveted cage. It is designed to provide maximum lubricating efficiency and to hold the rollers in proper alignment at all times.

High Intensity Magnetic Separator

THE Dings Magnetic Separator Co., Milwaukee, has announced a new high-intensity separator that makes magnetic separations said to be heretofore impossible. This machine is described as handling satisfactorily separations between such weakly magnetic materials as slate from gypsum or coal. It has been demonstrated successfully on silica sand, feldspar, coal, gypsum and other materials where they have become mixed with supposedly non-magnetic steel or abrasion. It removes biotite, muscovite and pure oxide of iron from feldspar and silica, and it is said to have been proved on many other combinations of materials. The machine operates on the induction principle.

Passing upon a complaint by the J. D. Crosby Co., Pawtucket, R. I., the Interstate Commerce Commission in a recent decision held that rates on hot-rolled steel, in carloads, from points in Ohio, Pennsylvania, West Virginia and New York to Pawtucket are not unreasonable or otherwise unlawful. Illustrative of the rates is that of 40c. per 100 lb. on shipments from Youngstown and Pittsburgh. The complainant sought a rate of \$6.10 a gross ton.

OBITUARY

WALTER S. COMLY, general manager of sales and assistant treasurer of the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., died Jan. 18 at his home on Comly Avenue, Port Chester. Mr. Comly, who was 69 years of age, had been ill for a year. He had been connected with the bolt and nut business for almost 54 years. He learned his trade as a machinist with the Russell, Burdsall & Ward company and in 1884, when William L. Ward left the firm which his father had founded to form his own company, the Port Chester Bolt & Nut Co., Mr. Comly and his father, Samuel Comly, went with the new concern, of which his father was sales manager. Samuel Comly died before the consolidation of the two companies in 1901 and Walter S. Comly became general sales manager of the combined companies. Samuel N. Comly, son of the deceased, is in the sales department of the Russell, Burdsall & Ward company.

❖ ❖ ❖

HAROLD BROOKS GARDNER, Eastern manager for the Westinghouse Air Brake Co., Wilmerding, Pa., with headquarters at New York, died at his home in New Rochelle, N. Y., on Jan. 2. He was born at Altamont, N. Y., and attended Union College, from which he was graduated in 1916. He was first employed by the Locomotive Stoker Co., Pittsburgh, with which company he remained until 1923. At that time he joined the New York sales organization of the Westinghouse company, but three years later went to Chicago as vice-president of the Westinghouse Friction Draft Gear Co., where he remained for one year before returning to New York in his recent capacity.

❖ ❖ ❖

ROY ANDERSON, general manager, Red Oak Bridge & Iron Co., Red Oak, Iowa, died on Jan. 17.

❖ ❖ ❖

RICHARD STRESAU, since 1919 consulting and research engineer, A. O. Smith Corp., Milwaukee, died of heart disease at his desk on Jan. 13. He was 50 years of age and a graduate of Massachusetts Institute of Technology. Mr. Stresau was instrumental in the development of the electric welding processes used by the Smith company.

❖ ❖ ❖

DAVID DANIEL JAMES, one of the founders of the James Mfg. Co., Fort Atkinson, Wis., manufacturer of steel barn and farm devices, died Jan. 13, aged 76 years.

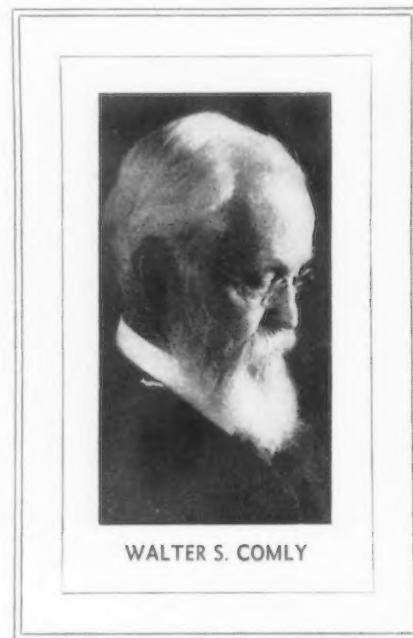
❖ ❖ ❖

DEWITT F. RIESS, vice-president, Vollrath Co., Sheboygan, Wis., manufacturer of enameled steel and cast

iron wares, died suddenly at Chicago on Jan. 8, while on a business trip. He was 45 years of age and has been associated with the company since 1907. His father, the late John R. Riess, was one of the founders of the company.

❖ ❖ ❖

JAMES F. WALSH, vice-president of Moline Iron Works, Moline, Ill., died



WALTER S. COMLY

Jan. 12 at his home in Oak Park, Ill., after a two weeks' illness. Mr. Walsh was also manager of the Elkhart division of the Chicago Hardware Foundry Co. He was 47 years old.

❖ ❖ ❖

THOMAS FARRELL, associated with his father, JAMES J. FARRELL, in the management of the Sheet Metal Mfg. Co., Youngstown, died after an appendicitis operation on Jan. 16, aged 23 years.

❖ ❖ ❖

ROY W. ROUNSEVILLE, manager of the Kewanee, Ill., works of the Walworth Co., with which he had been associated since 1906, died of a cerebral hemorrhage on Dec. 26, aged 46 years.

❖ ❖ ❖

J. THOMAS MOLTRUP, president and general manager, Moltrup Steel Products Co., Beaver Falls, Pa., maker of cold-drawn steel, shafting and foundry flask plates, died at his home in that city on Jan. 13. He was born at Loudonville, Ohio, 61 years ago, but went to Beaver Falls as a young man and spent the greater part of his business life there. He was identified with the founding of the Standard Gage Steel Co. and the Standard Connecting Rod Co. and was also

active in the merging of these organizations under the former's name. With his brother, he founded the Moltrup company in 1914 and had served as its active head since that time. He was well and favorably known in industrial and civic affairs in the Beaver Valley.

Anti-Injunction Bill Has Strong Support

WASHINGTON, Jan. 19.—Strongly supported by the American Federation of Labor, Senator Norris, Progressive, Nebraska, is making an earnest effort to bring his so-called anti-injunction bill on the floor of the Senate for early consideration. The measure now is before the Committee on Judiciary, of which the Nebraska Senator is chairman. It would greatly restrict the power of the courts to issue either temporary or permanent injunctions in case of labor disputes and has been vigorously attacked by many employer interests.

Recent efforts of the National Coal Association and other employer organizations to appear before the judiciary committee to oppose the measure were denied when the committee voted not to hold further hearings. It gave permission to protestants to file briefs on or before Jan. 25.

Opponents of the measure have predicted that it will be brought to the floor of the Senate soon after briefs are filed and are inclined to think it will pass that branch of Congress. Unless blocked by other legislation, it is thought the bill also has good prospects of being passed in the House. The administration has not made known its views on the measure.

Southern Rates on Road Guard Rails Lowered

WASHINGTON, Jan. 19.—The Interstate Commerce Commission has authorized railroads to establish the same rates on steel highway guard rails between points in the South as those applying to special iron and steel articles. The result will be the lowering of rates on guard rails. At present they take sixth-class rates.

Electric hoist orders in December increased 32.67 per cent in number, compared with November, according to reports of members of Electric Hoist Manufacturers Association, New York. Shipments, however, were 26.461 per cent less in December than in the preceding month.

A New 18 and 8 Free-Machining Steel with High Sulphur



A NEW free-machining chrome-nickel steel has been developed by the Carpenter Steel Co., Reading, Pa. It has been designated as Carpenter stainless steel No. 8 and it is made under a patent issued recently to Frank R. Palmer, assistant to the president, and assigned to the company. The patent covers the general use of abnormally high sulphur to provide the free-machining properties. The broadest claim of the patent reads:

"As a composition of matter, a corrosion-resisting alloy steel containing essentially between 7 and 30 per cent of chromium and between 0.15 and 1.80 per cent of sulphur, and characterized by anti-friction quality."

Early in 1928 the Carpenter Steel Co. placed on the market a high sulphur stainless steel, made under the pending patent, which revolutionized the whole program of machining these high-chromium alloys. This new steel was known as Carpenter stainless steel No. 5 and had the following type analysis:

	Per Cent
Carbon	0.10
Chromium	14.00
Sulphur	0.30

During the past four years, since this new grade was introduced, it has become generally recognized that high-sulphur chromium iron can be machined in automatic screw machines with standard shop tooling at speeds equal to, or closely approximating, those used for common Bessemer screw stock. The problems of drilling, tapping, die threading and even drilling with gun barrel drills, were instantaneously solved by the use of high-sulphur steel.

Sulphur Solved Machining Problem

The sulphur addition not only solved the machining problem but cleared up the very fountain head of the trouble, the high friction qualities. It was found that wire and tubing could be cold drawn with no metallic coating, or by simply using the lime coat and lubricants normally employed for common steel.

From a service standpoint, the non-galling, non-seizing properties of high-sulphur stainless steel has led to its wide adoption for mountings in gate valves to prevent scratching when opened and closed—in pump rods to prevent galling and scratching in the packings—and a great variety of similar applications. This steel has been almost universally adopted for golf club heads because

the cost of hand grinding and polishing was reduced by approximately 50 per cent, due to the free-grinding properties of the metal.

This latest addition to the free-machining family made under this patent is a free-machining chrome-nickel stainless to the popular analysis containing 18 per cent chromium and 8 per cent nickel, under the name of Carpenter stainless steel No. 8. These chrome-nickel steels not only possess high frictional properties by reason of the chromium but, independent of this, they are extremely difficult to machine because of their austenitic structure and their great toughness. For many years they have been considered almost impossible to machine but of late, through ingenious tooling, some of this difficulty has been overcome. The new high-sulphur 18-8, however, brings the austenitic chrome-nickel stainless types into the class of free-machining products.

Results of Machining Tests

An exhaustive test recently run in the plant of a bolt and nut manufacturer gives some interesting compar-

isons. In this test all operations were conducted simultaneously on Carpenter stainless steel No. 4 (which is the orthodox 18-8 analysis containing low sulphur) and Carpenter stainless steel No. 8 (the same base composition with high sulphur).

On a four-spindle Gridley automatic, drilling and cutting off standard nuts from a $\frac{5}{8}$ in. cold drawn hexagon bar, the highest speed attained on the non-free-cutting steel was 120 surface feet per minute, which dropped a finished piece from the machine every 20 sec. This speed was excessive, however, since the tooling began to break down after 12 nuts had been made. The new No. 8 bars were run at a surface speed of 150 ft. per minute with increased feed, dropping a nut every ten seconds with no indication of damage to the tools. Taking high-sulphur Bessemer screw stock as 100 per cent, the new No. 8 grade was run at a production of 75 per cent, and, compared to S. A. E. 3135, the production was 125 per cent.

The corrosion resistance of these high-sulphur grades is just about the same as the low-sulphur types and it is now common practice to use the free-machining grades and corresponding non-free-machining grades interchangeably—the buyer simply selecting his type with consideration to the methods he will use to fabricate his finished parts. It is general practice to use the non-free-machining types for parts brought to shape by bending, forming or drawing, and to use the free-machining type for parts brought to shape by machining.

Sees Large Development for Rustless Steels

L. S. Hamaker, sales executive, Republic Steel Corp., says that a careful survey recently conducted by his company indicates an undeveloped field for corrosion-resisting steels of \$100,000,000 in the packing industry alone. It is Mr. Hamaker's opinion that the field for specialty metals of this kind is scarcely tapped, and the problem, he declared, is not so much to find new uses, as to distinguish between those which are profitable and unprofitable.

He predicted great expansion within the next few years in the applications and uses of stainless steels. Mr. Hamaker also pointed out that the dairy industry offers great possibilities in the use of such steels; the oil industry, in "cracking" processes, special alloy steels being especially valuable where high temperatures and high pressures are encountered; in the automotive, canning and building industries; also in the manufacture of restaurant and cafeteria equipment, in production of soda fountains, steam tables, steam and boiler tubes and for

every product which is subject to corrosion.

Mr. Hamaker stated that, in its original researches, the Republic company estimated the automotive industry as one of the largest potential consumers of rustless steels, but has since revised this estimate, declaring that the product is too high-grade for a machine which will only last from seven to nine years. Alloy steels are made to last from 50 to 100 years, he said.

Members of the American Society for Testing Materials in the New York district will meet Thursday evening, Feb. 18, jointly with the iron and steel division, institute of metals division, and New York section of the American Institute of Mining and Metallurgical Engineers. Dr. F. O. Clements, president, A. S. T. M. and technical director, General Motors Research Laboratories, will discuss "Limits of Our Knowledge of the Properties of Metals." Prof. H. F. Moore, past-president, A. S. T. M. and research professor of engineering materials, University of Illinois, will talk on "Test Results and Service Values of Metals."

New Company to Make Industrial Machinery

The Patterson Engineering Corp., Akron, Ohio, has been organized to manufacture machinery for rubber, plastics, fuel and other industries. This company is affiliated with the Patterson Foundry & Machine Co., East Liverpool, Ohio. R. L. Cawood, president of the East Liverpool company, is president of the Patterson Engineering Corp.; R. B. Koontz, formerly president and general manager of the Adamson Machine Co., Akron, is secretary and treasurer, and P. E. Welton, consulting engineer, is vice-president.

The company is at present located in the United Building, Akron, but will establish offices in the Federal Building in that city, Feb. 1, where it will maintain an engineering and sales office.

Several Factors Favor Building Gain in 1932

Building volume in 1932 will depend largely upon what constructive action is taken to stimulate it, according to Edward J. Harding, managing director, Associated General Contractors of America, in a report on the construction outlook for the current year. "There is no argument," states Mr. Harding, "as to the construction industry occupying the strategic point in any attempt to force the movement toward business recovery. The only argument that can exist concerns ways and means to maintain construction awards at a level that will secure the desired objective."

Effective leadership in the movement toward business recovery, Mr. Harding says, can be provided by Federal Government sponsorship of extensive public works projects. Private building enterprise would, in turn, derive much needed confidence from such leadership. Interest in private construction, it is pointed out, has already been stimulated by President Hoover's Conference on Home Building and Home Ownership, and other remedial agencies would undoubtedly accelerate activity in this branch of the industry.

Forecasting the volume of building construction, exclusive of public works, the Copper and Brass Research Association estimates that \$3,420,000,000 will be expended in 1932, an increase of 17.5 per cent over 1931. Although the dollar-value of building foreshadowed for 1932, the association states, is a sharp drop from that of the prosperous period beginning in 1922 and climaxed in 1928 with an expenditure of \$7,555,500,000, the contrast is not so great in view of the marked drop in material and labor costs.

Several factors that may lead to in-

creased building in 1932 are cited by the research organization. The demand for reduced living costs may promote suburban development on a large scale. The decided trend from cities to rural and semi-rural communities, noted by census authorities, may force increased construction in these areas. Government building programs are expected to reflect a sharp increase in public construction work, which in average years has amounted to only 1.7 per cent of the total. Lower construction costs will probably stimulate reconditioning and modernization of buildings and homes, and the trend among merchants to meet new competitive conditions with modern stores can be expected to swell the building volume for 1932.

tracts for 1931 were approximately the same as for 1930.

The only sizable merchant contracts placed with Great Lakes shipyards in 1931 were for two twin-screw cargo ships for the Ford Motor Co. In addition to seagoing vessels, numerous small craft, valued at approximately \$14,000,000, were contracted for in seaboard, river and Great Lakes shipyards.

About 17,000 men were employed on new merchant and Government construction in the coastal shipyards on Jan. 1, or about 5 per cent less than the number employed on Jan. 1, 1931. The value of unfinished work on hand in those yards on Jan. 1 was about \$58,000,000, compared with \$90,000,000 on Jan. 1, 1931, a reduction of about 35 per cent.

Prospects for new merchant or Government tonnage is not encouraging, according to the annual report of the National Council of American Shipbuilders, 11 Broadway, New York. Under existing mail contracts there are no vessels, except those now under construction, required for delivery in 1932, and only two for delivery in 1933. Much shipping, in sympathy with the general depression, is laid up, and inquiries for new seagoing tonnage are virtually absent. More than 200 vessels in the Shipping Board's wartime emergency fleet are still idle, and an oversupply of vessels for coastwise service tends to depress further the outlook for new business. Some hope, however, is offered by the fact that about 11 per cent of American seagoing tonnage has been in service for more than 20 years, and the replacement of some of this tonnage should attend a revival of business.

Shipbuilding in Great Britain was seriously depressed in 1931, with unemployment in the industry at about 75 per cent. In other foreign countries shipbuilding has been far below normal. Italy, however, has enjoyed a fair amount of activity, occasioned by the construction of several large vessels for home account and Government vessels for foreign account.

York Plant Has Worked Full Through Depression

York, Pa., Jan. 19.—The Brandt-Warner Mfg. Co., maker of "Bilt-Well" nickel-chromium automobile axle shafts, is operating full force night and day and has been doing so throughout the period of the depression. There have been no salary or wage reductions and profits are satisfactory, President W. C. Bulette said. He stated further that indications are the company will continue its present operations indefinitely.

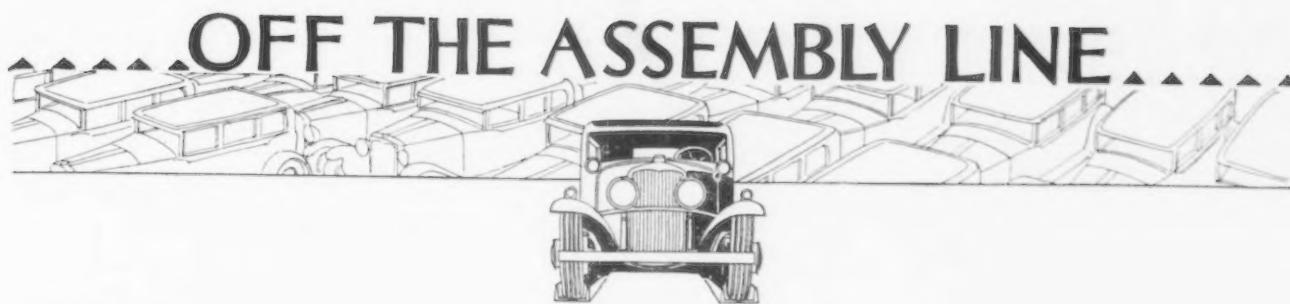
It distributes its product through jobbers and has markets in all sections of the United States as well as abroad. It has 50 employees.

It is the opinion of Mr. Bulette that confidence, so essential to business recovery, would be stimulated if producers would insist on a fair profit in return for quality goods and be ready to pay a fair profit for the materials they use. It is his view that the public is skeptical of under-priced goods, causing it to withhold buying.

Work Being Found for Unemployed Engineers

Engineers are thinning the ranks of their unemployed in the New York area, jobs having been found for nearly 50 per cent of the 1200 men who have registered at the Work Bureau, it is announced by H. de B. Parsons, chairman of the Professional Engineers' Committee on Unemployment, New York.

It is estimated that by the latter part of February 90 per cent of the registrants will have obtained part or full time work. Government projects and various engineering studies, now in preliminary stages, will provide jobs for several hundred.



Expansion at Detroit Awaits Disclosure of Ford's Plans

DETROIT, Jan. 18

ON several occasions it has been pointed out in this column that the key to the automotive situation is in the hands of Henry Ford. This is even more true today than it was a month ago. The New York show is over and many new models have been revealed to the public, but Detroit believes that the real competitive test is yet to come. It will not occur until Mr. Ford sees fit to disclose his plans, whether that be next week or two months from now; meanwhile, it is no exaggeration to say that in large measure the industry will mark time. The industry is anxious to see what kind of car model B is and to know at what level both the eight-cylinder and four-cylinder models are to be priced. There is a feeling in Detroit that present activities, especially in the low-price field, are merely a part of the skirmishing prior to the opening of the battle royal for sales supremacy in the not distant future.

What Mr. Ford intends doing is more of a moot question today than it was a few weeks ago. It is fairly well established that the chassis of the new car has been decided upon, but not the power plant. The personnel of the drafting rooms at Dearborn continues abnormally large, indicating that plans still are in the development stage. The conviction is growing in certain quarters that the Ford V-eight is farther in the future than general opinion believes, owing to the slowness of Mr. Ford in deciding upon certain features of the car and to the time necessary in tooling up the Rouge plant for the manufacturing task. It may be that Mr. Ford will find it convenient to offer his new four first to supply competition for Chevrolet, then announce the eight somewhat later. At any rate, little is expected in the way of Ford production until March, although some manufacturing

January motor car output estimated at 140,000 cars.

* * *

Chevrolet has stepped up this month's schedule to 60,000 cars.

* * *

Eight-cylinder Ford reported still in formative stage.

* * *

departments at Rouge are reported running at a fair pace.

Recovery Being Held Back

One thing on which Detroit agrees is that recovery in the automobile industry and allied lines is being held back by the indecision at Dearborn or the reluctance of the Ford interests to uncover their plans. Many parts makers have on their books orders placed weeks ago on which they still are awaiting releases. Meanwhile, they have not been in a position to take on other work for fear that on a day's notice they may need to put all their resources into the making of Ford supplies. So far as Ford's competitors, with the exception of Chevrolet, are concerned, they too are ultra-conservative at the moment. Plymouth operations practically are at a standstill and will not materially improve until it brings out its new body designs some time in the spring, assuredly not until after Mr. Ford has made known his program. Willys-Overland is said to be making some further changes in the designs of its cars; during the interim its plant at Toledo is doing little.

The Ford company is reported to be running four open-hearth furnaces at Rouge. Until its production reaches at least a fair level, it is believed that its own steel plant will be able to fur-

nish most of its requirements in certain lines, such as spring steel. Releases have been given for small lots of steel, including axle steel, the orders for which were placed some time ago. No fresh buying of consequence has yet been done. Murray Corp. is turning out about 300 Ford frames a day at Ecorse, but most parts suppliers in this district have only meager shipping releases against current contracts.

Chevrolet Increases Schedule

Starting with a goal of 52,000 cars this month, Chevrolet increased its schedule by 3000 and in the past few days has added another 5000, so that it now is expected to make about 60,000 cars in January. It is perhaps the only big bright spot for the steel people. The company's gray iron foundry is operating four days a week pouring 1200 tons of iron a day.

From the introduction of its new models Nov. 14 until Jan. 10 Buick delivered 13,562 cars to dealers. Its schedule this month is showing a decline from December, being under 10,000 units. At least until dealers are stocked, Pontiac is in the midst of a boom, with over 10,000 cars due to come off the assembly lines this month and the Fisher Body plant at Pontiac working 11 and 12 hr. a day, seven days a week, turning out Pontiac bodies and Oldsmobile doors. Oldsmobile probably will make over 6000 cars this month. Now that most new models of various manufacturers have been revealed, Graham still is regarded as having the most distinctive body design of the year and is profiting by this achievement. January is expected to be one of the largest production months in its history. Rockne's output at the local Studebaker plant is being stepped up as rapidly as possible, but is as yet small. Cadillac and Auburn are busy on dealers'

stocks, likewise Hudson-Essex and Packard.

Heavier Chassis Frames Used

A marked advance has been made in 1932 models in stiffening the chassis frames. Frame sections are much deeper than heretofore and more cross members are used. Some manufacturers, such as Chrysler and Hudson, are employing a bridge type of frame with a heavy X-member. Hupmobile has an exclusive feature in its chassis torsional stabilizer which ties the frame, body and radiator firmly together. More steel and less wood also is found in the new bodies.

* * *

The Chrysler Corp. shipped 270,927 cars in 1931, compared with 266,169 during the previous year. The increase was accounted for entirely by the Plymouth division, which produced 109,223 cars last year, against 72,033 in 1930. During 1931 Dodge turned out 57,212 cars, Chrysler 55,212, and DeSoto 31,199. Shipments of trucks, buses and taxicabs amounted to 17,921 units.

* * *

With December automobile production in the United States and the Dominion now estimated at 120,107 cars, somewhat higher than the industry anticipated, the past year's total was 2,468,493 cars. January should see an output of 140,000 to 150,000 cars.

* * *

Lincoln is employing 3600 men, the largest number since 1928, on a full five-day week, with production of 1000 new eight-cylinder and 12-cylinder cars set for this month.

* * *

Slightly more than 300,000 commercial cars were sold in the United States during the first 11 months of 1931. Of this amount Ford accounted for 133,000, Chevrolet 95,000, International 20,000, Dodge 12,000, General Motors 6500 and Reo 4800.

To Exhibit Heating and Ventilating Apparatus

More than 250 companies will display equipment at the second International Heating and Ventilating Exposition, to be held at the Public Auditorium Annex, Cleveland, Jan. 25-29.

The exposition is under the auspices of the American Society of Heating and Ventilating Engineers; both that society and the American Society of Refrigerating Engineers will hold their annual meetings at the Hotel Statler and the Hotel Cleveland, respectively, during the same week.

Products to be shown cover a wide range of heating, ventilating, air conditioning, refrigeration and control equipment. Welding outfits and supplies will also be shown. Charles F. Roth, Grand Central Palace, New York, is manager of the exposition.

Salary Reductions to Be Governed by Earnings

Salary reductions to be made by the Westinghouse Electric & Mfg. Co., East Pittsburgh, in 1932, are to be graduated according to the earnings of the company. This rather unusual plan, announced by A. W. Robertson, chairman of the board, will affect all salaries over \$200 a month, in amounts ranging from 10 per cent to 30 per cent, depending upon profits.

For each \$40,000 monthly in net earnings, 1 per cent will be subtracted from the maximum reduction of 30 per cent. In this way increasing earnings may possibly bring the total salary reduction down as low as 10 per cent. Salaries under \$200 a month are to be reduced 7/10 as much as those in the higher brackets.

The Westinghouse company reduced wages 10 per cent on Jan. 1. During 1931 salary reductions including loss of vacation amounted to 25 per cent. This year vacations with pay will be reinstated.

Institute of Metals Meeting Postponed

In view of the disturbed economic and financial conditions that prevail in Europe and America the council of the Institute of Metals has found it necessary to postpone the 1932 American meeting, which was to have been held in the United States and Canada next autumn. The meeting had been planned with the close cooperation—as prospective hosts—of the American Institute of Mining and Metallurgical Engineers.

The council's suggestion that the meeting be postponed was sympathetically received in America and the assurance has been made that the members will be welcome at such later time as may suit their convenience.

Steel Castings Symposium Planned by A. S. T. M.

A symposium on steel castings is to be held at the 1932 annual meeting of the American Society for Testing Materials in Atlantic City. This symposium, sponsored jointly by the American Foundrymen's Association and the A. S. T. M., is the second on the subject of castings sponsored by these two societies, the first having been held at the 1931 A. S. T. M. meeting and devoted to malleable iron castings.

The steel castings symposium will be a means of correlating and recording data on the properties of steel castings which are produced by widely used and accepted methods of manufacture including molding, casting,

use of alloys and heat treatment. An imposing group of papers has been arranged for the symposium, including both carbon and alloy steel castings. W. C. Hamilton, research director, American Steel Foundries, Chicago, is chairman.

Making Large Bells for a Carrillon

(Concluded from page 231)

ing on the size, and then the case is lifted off, the core knocked out, and the result is a new bell, which, because of the fine finish on the molds and the careful workmanship, might be put directly into service, if it were not for the necessity of tuning, which is one of the most difficult and delicate operations in the whole process of manufacturing.

After coming from the sand, the casting is sand-blasted, the gate and header are trimmed off and the bell is transferred to the tuning department where it is inverted and clamped rigidly to a base plate on the floor. The clamping device is located close to the top of the bell, to interfere as little as possible with vibrations. A specially designed shaping tool is lowered within the interior of the bell to remove metal as desired by the tuner. The tuner stands by the side of the bell with a large mallet and by sounding the bell at various points is able to judge with surprising accuracy the location and amount of metal to be removed.

Some of the difficulties of tuning a unit of a carillon may be appreciated from the fact that each bell must not only be in tune with itself, but with the others as a whole. Each bell is tested and tuned for five principal tones: the strike-note; the hum, an octave below the strike-note; the nominal, an octave above the strike-note; and two further tones known as the terce and the quinte.

A recent installation of bronze doors in the carillon tower of the Riverside Church, New York, required 40,000 lb. of bronze. In all, 60 doors were installed for protection of the church's carillon. Of these, 52 were on the belfry floor, built to operate in unison, giving the effect of single doors 30 ft. in height. The installation was made by the Cornell Iron Works, Long Island City, N. Y., manufacturer of metal doors since 1846.

Bosshardt Steel Corp., Canton, Ohio, has invited steel producers, foundrymen and metallurgists to attend a demonstration of the Bosshardt patented open-hearth furnace at its plant on Jan. 20, 21 and 22.

James A. Farrell to Retire in April; His Successor Not Yet Selected

James A. FARRELL, president and chief executive officer of the United States Steel Corpn., announced Jan. 12 that he would retire from these offices on April 18. Mr. Farrell's decision, which he made public on the twenty-first anniversary of his election to the presidency of the Steel Corporation, probably had been long considered, but he suddenly called newspapermen to his home at 944 Fifth Avenue, New York, late on Tuesday night of last week, after having attended the annual dinner of the presidents of the subsidiary companies of the corporation, and gave out the following statement, which he had prepared himself:

On April 1, I shall have been in the service of the United States Steel Corpn. and its predecessor company for upward of 50 years. For more than 21 years I have been president of the corporation, prior to which I was for eight years president of the United States Steel Products Co.

I firmly believe that the time has now arrived for my successor to be appointed in order to establish the management upon a more permanent foundation composed of younger men. I have therefore requested the board of directors to relieve me of my duties as president and they have consented to do so.

My retirement as president will take place at the time of the annual meeting, April 18. I have been asked to remain a member of the board of directors and have assured the board I shall be pleased to do so.

I have also given assurance that at all times I will continue to assist in every way the best interests of the corporation. My long service has been marked by unusual associations with America's foremost men, as well as leaders of industry in foreign lands, which offered contacts bringing me success and happiness. I will retire with a deep sense of obligation to all my associates for their loyalty, helpfulness and abiding friendship and with the greatest confidence in the future of the corporation and the steel industry. The basic principles, the character of our plants, and, above all, the



James A. Farrell

quality of the men of our corporation insure its continuing success.

New President Not Yet Chosen

No official mention has been made as to Mr. Farrell's successor. If the choice is made from among the present executive officers of the corporation, the president of one of the subsidiary companies or one of the corporation's vice-presidents probably will be selected. It is doubted that the corporation will go outside its own organization for a new president.

Pittsburgh has been agog over reports that coincident with the selection of a new president, the general executive offices of the corporation will be moved from New York to that city, but confirmation of this is not at present obtainable.

Although Mr. Farrell has been president of the corporation for more than 21 years, his appointment as chief executive officer did not come until December, 1927. This title had been held by the late Judge Gary in addition to the chairmanship of the board of directors.

Started as Mill Worker

Mr. Farrell's rise from a mill worker to executive head of the world's largest corporation has been achieved by a combination of qualities, of which hard work has played

an important part, as Mr. Farrell, himself, has freely admitted. In its comment at the time of his selection as chief executive officer, *THE IRON AGE* said:

"By incessant application to his vocation he has made it his avocation. A doer, a builder, he has had pride of workmanship in what he has created. Rising step by step from the lowest to the highest rung in the ladder, he has learned the value of thoroughness in solving the problems of production and distribution in the country's greatest manufacturing industry. A master of detail, by that very token he has been able to cope with broad questions of business policy. His long experience both in subordinate and in higher executive positions has given him an unusual insight into human nature and has brought into full development his natural talents for leadership."

Mr. Farrell, who was big and brawny as a youth, entered the wire mills of the New Haven Wire Co., New Haven, Conn., at the age of 16. He had various mill experiences in the next dozen years. He went to Pittsburgh in 1888 and was employed by the Pittsburgh Wire Co.; by 1894 he had become general manager of that company. In 1889 he became foreign sales manager for the American Steel & Wire Co., and when that company became a part of the merger which resulted in the formation of the United States Steel Corpn., he was made president of the export subsidiary, the United States Steel Products Co., where he remained until his selection on Feb. 1, 1911, as successor to William E. Corey in the presidency of the parent corporation.

The Gray Iron Institute, Inc., has organized a Connecticut group of gray iron foundrymen, with J. D. Colman, Bullard Machine Tool Co., Bridgeport, Conn., chairman; E. Sessions, Sessions Foundry Co., Bristol, cast chairman; Edgar Spencer, Philbrick, Booth & Spencer, Hartford, merchandise chairman, and W. J. Maiton, Waterbury Farrell Foundry & Machine Co., Waterbury, technical chairman. The Massachusetts and Rhode Island group has been organized, with Howard A. Stockwell, Barbour-Stockwell Co., Cambridge, as chairman. Similar organizations will be formed in the Philadelphia territory and New Jersey.

...PERSONALS...

JOHN S. NEWBERRY, heretofore president of the Detroit Steel Casting Co., Detroit, has been made chairman of the board, and S. W. UTLEY has become president, continuing as general manager. J. M. DUNCAN, who was general sales manager, has been appointed vice-president in charge of sales and F. A. MELMOTH vice-president in charge of operations.

❖ ❖ ❖

HENRY H. TIMKEN, Jr., for the past two years assistant works manager of the Timken Roller Bearing Co., has been made assistant to the president of the Timken Steel & Tube Co., Canton, Ohio.

❖ ❖ ❖

H. P. KIRCHNER has been elected president of the Hutto Engineering Co., Detroit, R. A. JACOBS, vice-president, and J. A. CARLIN, vice-president and general manager.

❖ ❖ ❖

CHARLES R. HOOK, president, American Rolling Mill Co., broadcast a message on Jan. 4 on the regular weekly Armco Iron Master program. The message, entitled "Let's Ride Out of the Valley," was a plea to the public to purchase automobiles and other commodities as the best way of leading industry "out of the valley of depression onto the broad highway of better times."

❖ ❖ ❖

KENNETH B. SPAULDING has been appointed sales manager of the Davis Boring Tool Co., St. Louis, manufacturer of boring tools and reamers. He formerly was associated with the McCrosky Tool Corp. in a similar capacity.

❖ ❖ ❖

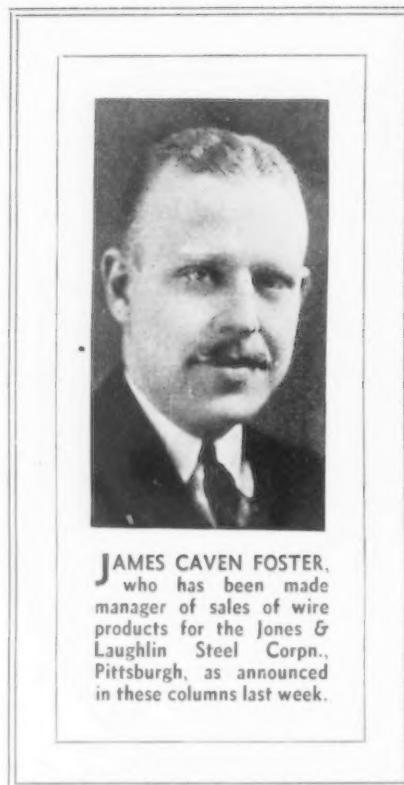
H. F. JENSEN, formerly in the Chicago office, Anaconda Wire & Cable Co., and at one time connected with its mill at Muskegon, Mich., has been appointed resident agent in Milwaukee, in charge of business in the Wisconsin and Minnesota territory. His headquarters is at 225 Thornapple Parkway, Wauwatosa, suburb of Milwaukee.

❖ ❖ ❖

E. H. McCARTY, vice-president and general manager, Nash Motors Co., Kenosha, Wis., has been elected president. He succeeds CHARLES W. NASH, who has been president and chairman of the board, and who retains the latter office. ROBERT B. ELLIOTT has been promoted to vice-president in charge of operations, and HAROLD E. LONG to vice-president and director of purchases.

❖ ❖ ❖

LEROY M. SHERWIN, superintendent of the Brown & Sharpe Mfg. Co., Providence, R. I., foundry, was elected president of the New England Foundrymen's Association at the annual



JAMES CAVEN FOSTER, who has been made manager of sales of wire products for the Jones & Laughlin Steel Corp., Pittsburgh, as announced in these columns last week.

meeting in Boston last week. ALBERT SWEET, of the Milford Iron Foundry, Milford, Mass., was made vice-president. GEORGE H. GIBBY, Gibby Foundry Co., East Boston, was reelected treasurer, and FRED F. STOCKWELL, Barbour-Stockwell Co., Cambridge, secretary.

❖ ❖ ❖

W. W. EATON, sales manager for the Babcock & Wilcox Tube Co., Beaver Falls, Pa., has been granted a six months' leave of absence, and during that time W. WOODWARD WILLIAMS will be acting general sales manager. Mr. Williams has been sales counselor for the Babcock & Wilcox company for the past three years, and previously served for six years as general sales manager and vice-president in charge of sales for the Pittsburgh Crucible Steel Co., Pittsburgh. He was graduated from Harvard University in 1905, and began his career in the industry with the Carnegie Steel Co., Pittsburgh. From 1911 until 1913 he was identified with the Bourne-Fuller Co., Cleveland, and subsequently served as general sales manager for the A. M. Byers Co., Pittsburgh, and later for the Reading Iron Co., Reading, Pa.

❖ ❖ ❖

LEO HELLER, formerly in charge of sales promotion and advertising for the hoist and body division of the Commercial Shearing & Stamping Co., Youngstown, is now assisting in the distribution of steel tile, a new product manufactured by the Youngstown

Pressed Steel Co., Warren, Ohio, for the Porcelain Tile Co., formerly of Chicago.

❖ ❖ ❖

ARTHUR J. TUSCANY, manager of the Gray Iron Institute, will deliver several addresses this week to groups of foundrymen on "How Gray Iron Is Serving Society and Industry." He was scheduled to address Rotarians at the Le Clair Hotel, Moline, Ill., at noon, Jan. 18, the Quad City Foundrymen's Association at the Chamber of Commerce, Davenport, Iowa, that night, a meeting of the Wisconsin chapter of the institute at the Schroeder Hotel in Milwaukee Jan. 20 and the Chicago chapter at the Palmer House Jan. 22.

❖ ❖ ❖

CHARLES KACHEL, who has been engaged in production of steel stampings with various companies during the past 21 years, has joined the Crosby Co., Buffalo.

❖ ❖ ❖

JAMES A. CAMPBELL, veteran chairman of the Youngstown Sheet & Tube Co., expects to leave shortly for California, where he will spend the remainder of the winter.

❖ ❖ ❖

CHARLES McDONOUGH, who has been identified with the Combustion Engineering Corp., New York, for the past 15 years, has been made publicity manager, succeeding CARL STRIPE, who has resigned to publish a new monthly magazine to be known as *Steam Plant Engineering*.

❖ ❖ ❖

G. KENNETH ABBOTT has become president of the Abbott Ball Co., Hartford, Conn., succeeding his father, the late George E. Abbott.

❖ ❖ ❖

E. L. ESSLEY, president and treasurer, E. L. Essley Machinery Co., Chicago, has left for Florida, where he will spend about two months.

❖ ❖ ❖

R. W. KOLKMEYER and C. F. KOLKMEYER, formerly in charge of the scrap department of the Walter Wallingford Co., Cincinnati, have taken charge of the same department with Domhoff & Joyce Co., the Wallingford company having withdrawn from the scrap trade.

❖ ❖ ❖

C. A. NIGHMAN, manager of the hot mills, cold roll mills, and wire drawing department of the Singer Mfg. Co., Elizabethport, N. J., has been granted a three months' leave of absence, which he will spend in southern California.

❖ ❖ ❖

T. H. WICKENDEN, since 1922 in charge of development work in the automotive and aeronautical fields for the International Nickel Co., has been appointed assistant manager of development and research. Trained at the University of Michigan, he

became metallurgist for the Studebaker Corp., which in due course put him in charge of the engineering department at the South Bend, Ind., plant. Later Mr. Wickenden was one of the engineering group which designed the first Chrysler car. H. J. FRENCH, since 1929 a member of the Nickel company's research staff at its laboratory in Bayonne, N. J., has been transferred to the development and research department in New York to take charge of development work in steel and iron. A graduate of the School of Mines at Columbia University, Mr. French was senior metallurgist at the United States Bureau of Standards before joining International Nickel. He was awarded in 1930 the Henry M. Howe Medal of the American Society for Steel Treating.

♦ ♦ ♦

HAROLD S. FALK, vice-president and general works manager, Falk Corp., Milwaukee, has been elected a director of the Heil Co., Milwaukee, to succeed the late George P. Miller. He is a nephew of Herman W. Falk, president, Falk Corp., and a vice-president of the Heil Co.

♦ ♦ ♦

JACK RUMER, who was connected with the Cleveland office of the Ferro Enamel Corp., has been appointed West Coast representative of that company. His headquarters are at the plant of the Ferro Enameling Co. of California, Oakland.

♦ ♦ ♦

R. D. EAGLESFIELD has been made Indianapolis district manager in charge of motor and welder sales by the Lincoln Electric Co., Cleveland. He will make his headquarters at 314 East Sixteenth Street.

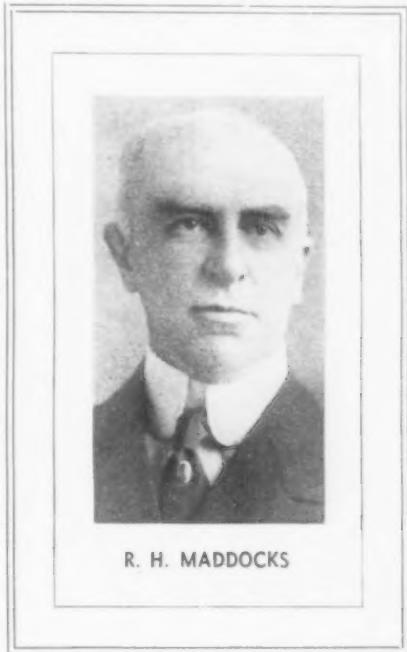
♦ ♦ ♦

E. W. FLANSBURG, heretofore superintendent of the Sycamore, Ill., mills of the Anaconda Wire & Cable Co., has been advanced to the superintendency of the Marion, Ind., mills of the company. CHARLES B. TOWNSEND has been appointed his successor in Sycamore. W. H. MORLEY, of the Sycamore plant, has been made superintendent of the Pawtucket, R. I., mills.

♦ ♦ ♦

CARL H. BECK has been appointed Eastern manager of the Westinghouse Air Brake Co., with headquarters at New York, to succeed the late H. B. Gardner. Mr. Beck entered the employ of the Westinghouse company as a special apprentice in 1905 after his graduation from Pennsylvania State College, and through a series of promotions rose to the post of general sales manager. This position was temporarily discontinued last May, and Mr. Beck returned to New York as a special representative.

R. H. MADDOCKS, sales agent in New York for the Central Iron & Steel Co., Harrisburg, Pa., on Jan. 18 celebrated his fiftieth anniversary in the selling of steel plates for that company. Although a number of men now living have been identified with the steel industry for half a century, few, it is believed, have continuously associated with one company for so long a time. Mr. Maddocks was the recipient of many congratulatory letters and telegrams from his business associates, including R. H. Irons,



Machine Tool Group Will Sell Through New Co.

The Bryant Machinery & Engineering Co., 400 West Madison Street, Chicago, has been organized to serve several machinery manufacturers as their consolidated sales department. A. G. Bryant, general manager of the machinery division, Joseph T. Ryerson & Son, Inc., Chicago, resigned that position Dec. 31 to become president of the new company. Mr. Bryant was identified with the Ryerson company in various capacities for 20 years, and for the past two years was secretary-treasurer of the Associated Machine Tool Dealers.

Others active in the management of the company are: A. P. Schumann, formerly sales manager, machinery division, Joseph T. Ryerson & Son, Inc.; Ira B. Yates, formerly chief engineer, machinery division, same company, and M. J. Wiora, who was office manager for the Ryerson company. Directors are: A. G. Bryant, G. A. Bryant, Jr., executive vice-president, Austin Co., Cleveland, and E. B. Wilkinson.

The companies the Bryant organization will represent are the Dreses Machine Tool Co., Cincinnati; Green Bay Barker Machine & Tool Works, Green Bay, Wis.; Kling Brothers Engineering Works, Chicago, and Ohio Machine Tool Co., Kenton, Ohio. These companies make a variety of metal-working machines. For these companies the Bryant company will serve as sales and advertising director. In some territories it will function as a dealer selling to the trade; in other districts representation will be given to selected machine tool dealer agencies. It will thus serve in the dual capacity of general distributor and local dealer.

Williams, White & Co. Buys Wisconsin Concern

Williams, White & Co., Moline, Ill., manufacturer of plate-working machines, forging equipment and other heavy machinery, has purchased the assets and goodwill of the Rock River Engineering Works, Janesville, Wis., and will manufacture that company's line of bending rolls, hydraulic straightening presses and hydraulic molding presses. G. H. Case, who was owner and general manager of the Janesville company, will be associated with Williams, White & Co.

The Link-Belt Co., Chicago, announces that it will continue the practice of issuing data sheets on material handling and power transmission. The fourth of this series covering power formulæ for chain conveyors and elevators is now being distributed.

Orders for business furniture in November were valued at \$909,937, against \$1,113,671 in October, according to reports received by the Bureau of the Census from 36 producers.

• • • E D I T O R I A L

Signs of Better Business Sentiment

OBERVERS closely in touch with industry and business have noted, during the past ten days, widely distributed indications of changing sentiment. While this cannot be said to have been based upon tangible expectations for the first quarter, it does represent an encouraging penetration of the defeatist atmosphere by rays of confidence. And, of course, a measure of hope and confidence must precede any upturn.

Renewed hope comes to business with the expectation that the Reconstruction Bill will act as an antidote to the present damaging liquidity complex of our credit and cash custodians, thus enabling money to again go to work. The general belief that an agreement has already been reached between management and labor with respect to railroad wage adjustments has also been a factor.

More concrete reasons for encouragement may be found in the success of the recent New York automobile show, in the rise of the index of machine tool orders in December, the first in many months, and in the prospective issuance of substantial equipment purchasing lists by a number of prominent companies.

As indicating sentiment in our industry, it may be of interest to our readers to know that *THE IRON AGE* has secured more new long-term business during the past six weeks than during any similar period in the past two years and, with but few exceptions, during any similar period since 1928. Investments in advertising are certainly quite definite indicators of the determination to do business.



THE vertical trust idea, popular during prosperity, has its disadvantages when things are not going so well. The theory of eliminating suppliers and pocketing all of the profits is attractive, but it also presents the less pleasant necessity of standing all of the losses. Specialized services increase rapidly in cost with diminished volume. "Live and let live" may again become a heeded motto.

• • •

ALFRED P. SLOAN, JR., a few years ago stated that the normal replacement market for cars in the United States and Canada would amount to at least 4,000,000 units per year. During 1931, 2,468,493 cars were produced in these two countries; a total which leaves a deficit of more than a million and a half cars under the "normal" replacement level. Two full years of deficit in normal replacement requirements pile up a pretty large total of unfilled wants which form a backlog of potential future buying. The automotive industry

seems to have sound statistical grounds for its belief that it may once more head the procession when the elusive corner has been rounded.



Financing Business Reconstruction

THE Reconstruction Finance Corporation bill in all probability will become a law this week. No efforts are being spared to expedite this urgently needed legislation, upon which industry and business are apparently well justified in placing hope for a substantial easing of the credit situation.

A wide canvassing of reliable legislative and business opinion indicates that this measure provides a carefully studied and business-like approach to the release of frozen credit and the restoration of confidence in the public mind, both of which are necessary predecessors to recovery.

Unlike the National Credit Corporation, which was organized as a private company managed by bankers and operating largely as a mutual insurance organization for the preservation of bank liquidity, the Reconstruction Corporation will have broad powers for relieving credit strains in all strata of industry and business as well as agriculture. It will operate similarly to the War Finance Corporation which successfully met the severe requirements of war-time days. The men selected for its direction are such as to provide assurance that its purposes shall be carried out. And inasmuch as that purpose is primarily the restoration of confidence in our financial fabric and the reconstruction of an adequate credit structure, it may be hailed as the most constructive step yet taken toward better business.



Scaling Down Estimates of Steel Capacity

WHAT is the present ingot capacity of the country? In the days of wide fluctuations of pig iron prices it used to be said that the total effective blast furnace capacity was that which could operate without loss at current prices. Similar considerations must now enter calculations of steel ingot capacity.

For a number of years *THE IRON AGE* succeeded in making close estimates of capacity by taking the last official figures, adding the new capacity reported in its annual survey and making an allowance for the increasing output of existing plants. Thus, this publication's estimates were 63,500,000 tons for capacity at the end of

COMMENT . . .

1929 and 67,000,000 tons at the close of 1930, while the official figures subsequently issued by the American Iron and Steel Institute were 63,067,546 tons and 66,897,096 tons respectively.

This method of estimating needs revision, since some of the capacity heretofore included in the institute's totals has been idle for a considerable period and, in view of rapid progress in the technique of steel manufacture, may never "come back." Whereas computation on the basis used heretofore would develop an estimate of 72,335,000 tons of ingot capacity as of Dec. 31, 1931, actual "practical" capacity may not exceed 70,000,000 tons.

• • •

ONE of our editors visited a metal-working concern in York, Pa., last week and noticed a sign hanging in the office of the establishment. It read: "We will not discuss the depression." The injunction is strictly observed. Employees of this firm spend all of their time constructively. We predict that as a consequence the sign will shortly be changed to read: "We do not know any depression."



The Trend Toward Consumer Products

others, during the past two years, would seem to upset the theory that, during a depression, the corporation check book exercises more buying power than the pay check. Electrical appliances, which of course are primarily consumer goods, including refrigerators and other articles of home convenience, maintained better volume ratios than such items of capital expenditure as are represented by power plant equipment.

In the final analysis, of course, even the most highly specialized of capital investments become consumer products. Trolley cars and the power plants that propel them must be ultimately financed by the fares paid by individual consumers of transportation. Sheet mills and machine tool equipment are largely financed by purchasers of automobiles and other metal products.

That consumer products have maintained a better volume than so-called "capital" goods during the past strenuous months may be due to tacit recognition of the theory of overcapacity. On the other hand, it may be due to the fact that, in spite of all that has been said about the need of financing consumption, the individual finds it easier to secure the cash or credit to buy what he

wants than does the well rated industrial or business concern to buy what it needs. Whichever it may be, the facts seem to upset some well entrenched theories.



Bankers Must Broaden Their Viewpoint

"BANKERS must broaden their viewpoint" reported the Wheeler Committee in its recent study of means of alleviating unemployment. Most of our readers will say "amen" to that statement on the basis of personal experience in attempting to secure credit.

Employers in industry and business who have successfully held their companies intact through the past two years of stress and storm are the main factors in our hope for economic recovery. They have demonstrated their fitness through the hard law of the survival of the fittest. And most of them have not had much help from the bankers.

These men who have successfully demonstrated their ability to adjust outgo to diminished income have earned the right to be considered preferred credit risks on the basis of performance. Their paper collateral may have depreciated, but they are measurably stronger in the sounder and safer collateral of character and ability. However, under the present financial "liquidity complex," this sort of collateral is not negotiable.

And even the collateral of physical inventories of salable products is measured in ridiculous terms. Within the past week, a well rated scrap merchant of high reputation was offered a maximum bank credit of \$25,000 on the collateral of over a million dollars worth of scrap at present market prices!

The banker must serve business today and serve it adequately, or suffer the consequences. Regardless of precedents, traditions or customs, he must broaden his viewpoint, or he will be asked to take a back seat on tomorrow's business band wagon.

Based on their recent experience, business and industry might find it possible to plod along somehow without the banker. But it would be pretty hard for the banker to get along without industry and business.

• • •

IT is said that in view of the failure of orthodox methods of forecasting, many denizens of Wall Street have had recourse to the more primitive means of foretelling futures. In consequence, astrologers, clairvoyants and crystal-ball gazers are doing a land office business. The results probably average up, in accuracy, with the predictions of our popular business forecasters. Some day we will learn that the future can only be what we make it.

Modernization Stressed by Tool Builders at New England Regional Meeting

THE New England regional meeting of the National Machine Tool Builders' Association, held in Worcester, Jan. 15, was devoted to plans for refurbishing American plants with equipment with which to meet the new competition. The president of the National association, Robert M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill., presided. Addressing 50 representatives of New England machine tool companies, he said:

"People are asserting today that modern machinery has led to over-production and unemployment. Yet the facts are that we have more general well-being, less pauperism, more people per thousand gainfully employed than at any time since 1880. The need of the day is the installation of more modern equipment.

"The tools we will show in our exposition in Cleveland next September, such as lathes, grinders, gear-shapers, milling machines, etc., compared with those of a decade ago, may almost be regarded as new inventions. They have new speed, new power, new accuracy, they are quicker to set up, easier to operate. They make possible increased production at greatly lowered costs.

"But the new machines have not been fully put to use. A recent survey of 22 chief manufacturing industries revealed that 48 per cent of the machine tool equipment in their factories is more than 10 years old. In the light of our recent technical advances all this old equipment is obsolete. It must be thrown out. Lower costs are required to stabilize manufacturing at the lower commodity prices which now prevail. We cannot much further reduce wages without destroying the buying power of the consumer. We don't have to ask labor to give us these lower costs. Our new machines are ready to do the job."

President Gaylord introduced to the members Boyd Fisher, the association's new general manager. Reports of association activities comprised "The Completed Cost Manual", by Robert B. Service, Jr., superintendent of factory accounting division, Norton Co., Worcester; the 1932 exposition, by W. P. Kirk, vice-president, Pratt & Whitney Co., Hartford, Conn., and "The Index of Orders," by Mrs. Frida F. Selbert, association secretary, which latter topic was discussed by F. W. McIntire, vice-president, Reed-Prentice Corp., Worcester.

Sales activities today were discussed by W. A. Viall, vice-president, Brown & Sharpe Mfg. Co., Providence, R. I.; Albert J. Gifford, treasurer, Leland-Gifford Co., Worcester;

Edward L. Steinle, vice-president, New Britain-Gridley Co., New Britain, Conn., and S. T. Massey, vice-president, Heald Machine Co., Worcester.

C. R. Burt, vice-president, Pratt & Whitney Co. and vice-president of the National association, presided at the afternoon session, the subject of which was "Modernization". Mr. Burt spoke on "Our Survey", Earle Whitehorne, assistant vice-president, McGraw-Hill Publishing Co., on "Progress of the Campaign", and Howard W. Dunbar of the Norton Co., "What the Machine Tool Industry Can Do."

Scrap Institute to Meet at Capital

The annual convention of the Institute of Scrap Iron and Steel will be held at Washington, March 8, 9 and 10. A nominating committee has been appointed to submit a slate of officers and new directors. Members of the committee are: Harry Silverstein, chairman, Charleston, W. Va.; Ike Wilkoff, Youngstown; Jack Forheimer, St. Louis; Abraham Isaac, Elizabeth, N. J.; Sloan Hurwitz, Buffalo; Walter Bregman, Chicago; Samuel G. Keywell, Detroit.

Limit Arbitration of Scrap Claims

Although approving the continuation of compulsory arbitration among members of the Scrap Iron and Steel Institute, the directors of that organization have placed a limit of \$3,000 on the amount of claims to be arbitrated under the compulsory rule, with the understanding that amounts above that sum may be voluntarily submitted to arbitration by mutual consent of the parties. Approximately 100 cases between members of the institute have been arbitrated in the last three years.

Will Aid in Revising Scrap Specifications

The board of directors of the Institute of Scrap Iron and Steel, at a meeting in New York, Jan. 14, accepted the invitation of the Department of Commerce to participate in a conference of the steel industry for the purpose of revising scrap iron classifications, with the aim of arriving at uniform specifications

wherever possible. The National Association of Purchasing Agents and the American Railway Association are expected to appoint committees to meet with a committee of the Institute of Scrap Iron and Steel in Washington to consider the problem. It was the consensus of opinion of the members of the board that the question of alloys in steel scrap will have to be given special consideration in any revision of scrap classifications.

Unfilled Sheet Orders Gained in December

Shipments of sheet steel increased slightly in December over November, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers covering independent producers. It was the lowest month of the year in sales and production, which declined slightly from November. Unfilled orders increased sharply. The December report and comparison in net tons follow:

	Nov.	Oct.	Dec.
Sales	102,867	117,195	99,706
Production	102,758	122,739	101,570
Shipments	94,975	129,365	103,400
Unfilled orders	147,169	159,367	119,677
Unshipped orders	58,533	66,778	46,349
Unsold stocks	74,763	70,465	80,191
Capacity per month	559,000	548,000	559,000
Percentage reporting	68.9	67.6	68.9

Percentages, Based on Capacity

Sales	26.7	31.6	25.9
Production	26.7	33.1	26.3
Shipments	24.6	34.9	26.8
Unfilled orders	38.2	43.0	31.0
Unshipped orders	15.2	18.0	12.0
Unsold stocks	19.4	19.0	20.8

Instrument Co. Opens New York Office

R. Fuess, Inc., Berlin-Steglitz, Germany, maker of instruments for scientific research and industrial control, has opened an office at 245 West Fifty-fifth Street, New York, with Dr. A. J. Ginsberg in charge.

Founded by Rudolph Fuess in 1865, the company offers a comprehensive line, which includes microscopes for polarization and for testing materials, microphotographic apparatus, cutting and grinding machines, hardness testers, measuring microscopes, lenses and magnifiers, cathetometers and rifle barrel testers. Also instruments for measuring temperature, air pressure and humidity; thermo-control instruments for measurement of flow, pressure and vacuum; spectroscopic apparatus and other standard and special instruments.

Suspends Pipe Rate

WASHINGTON, Jan. 19.—The Interstate Commerce Commission has suspended until Aug. 15 the proposed rate of 32½ per cent of first class on cast iron pipe and fittings in Western Trunk Line territory.

SUMMARY OF THE WEEK'S BUSINESS

Steel Orders and Operations Increase; Broad Recovery Not Yet Seen

**Ingot Production at 28 Per Cent—Automobile Buying and Influx of
Small Releases Aid Mills—Prices Still Weak**

IMPROVEMENT in steel business is more in the promise than in the performance. However, ingot output has increased to an average of 28 per cent for the entire country, compared with a little above 25 per cent last week, and there has been a more generous flow of small orders, particularly at Pittsburgh and Chicago, both for replenishment of depleted stocks and for immediate consumption.

Delays in certain developments are at least in part responsible for the slowness of steel to reflect the usual seasonal influences. The automobile industry is to some extent marking time pending the final disclosure of the new Ford model; the release of some expected railroad buying is undoubtedly held back by the prolonged negotiations over railroad wage reductions, and a good deal of public construction work that has been authorized is in abeyance because of financing difficulties. Tin plate contracts expected from two large can companies have been postponed until after the canners' convention next week.

SUCH gains in orders and operations as have occurred are in the main due to the automobile industry, notwithstanding that it is expanding its schedules slowly and cautiously, and to the requirements of miscellaneous consumers. Building construction and the railroads are playing a very small part in current releases.

Business is spotty as regards products and districts. The best operations are at Birmingham, where the rate is above 50 per cent, and in the Youngstown area, which has an average schedule above 35 per cent. In both instances increased activity of subsidiaries of the United States Steel Corp. has brought up the district averages. The Pittsburgh and Chicago districts are both at 25 per cent, Cleveland is at 35 per cent and Wheeling at 40 per cent.*

Bar and sheet mills are doing relatively better than other finishing departments. A Chicago bar unit is operating at 50 per cent, while sheet mills in the central district have stepped up output to an average of 30 per cent. Bars and sheets, being the most widely used products, are usually the first to respond to general business improvement. A large independent company whose capacity is dominated by structural shapes, plates and rails has had little gain in its orders this month. Some companies report increases in bookings of 10 to 15 per cent over the corresponding period of December.

INCLUDED in pending business of outstanding size is 35,000 tons of 20-in. pipe for a pipe line, on which a New York engineering firm is taking bids. A pipe line from Montana to Minnesota is also in prospect. The Erie Railroad is distributing its orders for 31,377 tons of rails, of which Steel Corporation mills will receive more than 25,000 tons. The New York Central rail inquiry probably will be for not more than 100,000 tons, as part of its last purchase of 175,000 tons is still unused.

Until the Ford Motor Co. releases volume orders for production of its new model, there appears to be no likelihood of any important increase in buying of steel by the automobile industry. The Ford orders may not come before February. This month's automobile output is estimated at 140,000 units, against 120,000 in December, a small gain for this time of year, and the February schedules are uncertain pending the consummation of the Ford plans and the outcome of sales drives at current automobile shows.*

THE price situation continues to be of major concern to steel companies, particularly makers of sheets. No. 24 hot-rolled annealed sheets are now generally available to large buyers at 2.15c., Pittsburgh, and some other grades are quoted lower or very weak. Some effort to strengthen prices may be expected, though it is clearly recognized by the steel trade that such a move is difficult when volume demand is lacking. On the other hand, experience has shown that declining prices discourage buying. Pittsburgh and Youngstown mills are trying to reestablish a 1.60c. a lb. Pittsburgh price on bars, and this figure is being quoted to small buyers not covered by contracts. Most of the larger buyers are protected through the quarter at 1.50c.

Following the recent \$1 reduction on Alabama pig iron for shipment to the North, the Birmingham producers have lowered the price to consumers in that district in like amount.

More activity in the purchase of heavy melting steel by Chicago district mills has had the opposite of the usual effect, having reduced prices instead of strengthening them. A 50c. decline in this grade at Chicago brings THE IRON AGE scrap composite price down to \$8.33. THE IRON AGE finished steel composite price is lower at 2.037c. a lb., only 78c. a ton above the low point of the 1921-1922 depression. The pig iron composite is unchanged at \$14.65.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Jan. 19, 1932	Jan. 12, 1932	Dec. 22, 1931	Jan. 20, 1931
No. 2 f.d.y., Philadelphia.....	\$15.64	\$15.64	\$15.51	\$17.76
No. 2, Valley furnace.....	15.50	15.50	15.50	17.00
No. 2 Southern, Cin'ti.....	13.82	13.82	14.69	14.19
No. 2, Birmingham.....	11.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.....	16.25	16.25	16.25	17.25
Basic, Valley furnace.....	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh.....	17.89	17.89	17.76	19.26
Malleable, Chicago*.....	16.50	16.50	16.50	17.50
Malleable, Valley.....	16.00	16.00	16.00	17.50
L. S. charcoal, Chicago.....	23.17	23.17	23.04	27.04
Ferromanganese, seab'd car-lots.....	75.00	75.00	75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.

Per Gross Ton:	Rails, heavy, at mill.....	Light rails at mill.....	Sheet bars, Pittsburgh.....	Slabs, Pittsburgh.....	Forging billets, Pittsburgh.....	Wire rods, Pittsburgh.....	Skelp, grvd. steel, P'gh, lb.....
	\$43.00	34.00	27.00	28.00	34.00	37.00	1.50
	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00	\$43.00	\$43.00	1.50
Light rails at mill.....	34.00	34.00	34.00	36.00	34.00	37.00	1.50
Rerolling billets, Pittsburgh.....	28.00	28.00	29.00	30.00	28.00	35.00	1.50
Sheet bars, Pittsburgh.....	27.00	28.00	29.00	30.00	28.00	35.00	1.50
Slabs, Pittsburgh.....	28.00	28.00	29.00	30.00	28.00	35.00	1.50
Forging billets, Pittsburgh.....	34.00	34.00	35.00	36.00	34.00	35.00	1.50
Wire rods, Pittsburgh.....	37.00	37.00	35.00	35.00	37.00	35.00	1.50

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.50	1.50	1.60	1.65
Bars, Chicago.....	1.70	1.70	1.60	1.70
Bars, Cleveland.....	1.55	1.55	1.65	1.70
Bars, New York.....	1.85	1.85	1.93	1.98
Tank plates, Pittsburgh.....	1.50	1.50	1.50	1.65
Tank plates, Chicago.....	1.70	1.70	1.60	1.70
Tank plates, New York.....	1.798	1.798	1.78	1.93
Structural shapes, Pittsburgh.....	1.50	1.50	1.50	1.65
Structural shapes, Chicago.....	1.70	1.70	1.60	1.70
Structural shapes, New York.....	1.76775	1.76775	1.7534	1.9034
Cold-finished bars, Pittsburgh.....	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh.....	1.40	1.40	1.50	1.55
Cold-rolled strips, Pittsburgh.....	1.90	1.95	2.00	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

Per Lb. to Large Buyers:	Jan. 19, 1932	Jan. 12, 1932	Dec. 22, 1931	Jan. 20, 1931
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.15	2.25	2.30	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill.....	2.30	2.40	2.40	2.45
Sheets, galv., No. 24, P'gh.....	2.80	2.80	2.80	2.90
Sheets, galv., No. 24, Chicago dist. mill.....	2.90	2.90	2.90	3.00
Hot-rolled sheets, No. 10, P'gh.....	1.60	1.60	1.60	1.60
Hot-rolled sheets No. 10, Chicago dist. mill.....	1.75	1.75	1.70	1.70
Wire nails, Pittsburgh.....	1.95	1.95	1.90	1.90
Wire nails, Chicago dist. mill.....	2.00	2.00	1.95	1.95
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill.....	2.25	2.25	2.25	2.25
Barbed wire, galv., P'gh.....	2.60	2.60	2.55	2.55
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.60	2.60
Tin plate, 100 lb. box, P'gh.....	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

Per Gross Ton:

Heavy melting steel, P'gh.....	\$10.25	\$10.25	\$10.25	\$13.25
Heavy melting steel, Phila.....	7.50	7.50	7.75	10.50
Heavy melting steel, Ch'go.....	7.25	7.75	7.75	10.25
Carwheels, Chicago.....	7.50	8.50	8.50	10.75
Carwheels, Philadelphia.....	10.50	11.50	11.50	13.50
No. 1 cast, Pittsburgh.....	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia.....	10.00	10.00	10.00	12.00
No. 1 cast, Ch'go (net ton).....	7.50	7.50	8.50	9.50
No. 1 RR. wrot., Phila.....	8.50	9.50	9.50	12.00
No. 1 RR. wrot., Ch'go (net).....	6.50	6.50	6.50	8.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	7.62 1/2	7.62 1/2	7.37 1/2	10.12 1/2
Electrolytic copper, refinery.....	7.25	7.25	7.00	9.75
Tin (Straits), New York.....	22.05	22.00	21.87 1/2	25.87 1/2
Zinc, East St. Louis.....	3.00	3.05	3.15	4.00
Zinc, New York.....	3.37	3.42	3.50	4.35
Lead, St. Louis.....	3.55	3.55	3.55	4.55
Lead, New York.....	3.75	3.75	3.75	4.75
Antimony (Asiatic), N. Y.....	6.00	6.00	6.25	7.37 1/2

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

Jan. 19, 1932	2.027c. a Lb.
One week ago	2.032c.
One month ago	2.095c.
One year ago	2.142c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

Pig Iron

\$14.65 a Gross Ton
14.65
14.79
15.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$8.33 a Gross Ton
8.50
8.58

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH	LOW
\$11.33, Jan. 6:	\$8.50, Dec. 29
15.00, Feb. 18:	11.25, Dec. 9
17.58, Jan. 29:	14.08, Dec. 3
16.50, Dec. 31:	13.08, July 2
15.25, Jan. 11:	13.08, Nov. 22
17.25, Jan. 5:	14.00, June 1
20.83, Jan. 13:	15.08, May 5

Pittsburgh Steel Business Experiences First Definite Gain of the Year

PITTSBURGH, Jan. 19.—Finished steel releases in the past week showed the first definite improvement of the year, although the gains were rather limited on some products. However, specifications came from well diversified sources, and were in many cases the first releases since before the holidays. The automobile industry continued to lead as a consumer, but some tonnage was by agricultural implement makers, and a little by the railroads. New orders of Pittsburgh mills are still light, but include a share of the 1932 requirements of the Erie Railroad.

Inquiry is also appearing in better volume, with structural and reinforcing bar projects in the lead. A New York engineering firm is taking prices on 35,000 tons of 20-in. pipe. Other line pipe tonnage is said to be in the offing. Manufacturing consumers are not willing to place orders in advance.

Steel ingot production in the Pittsburgh district is higher again this week, being estimated at 25 per cent of capacity. No change in active blast furnaces is reported, but some stacks now banked are scheduled to resume operations early in February. Ingots production in the Valleys has risen sharply because of the increased activity of the leading interest, and is estimated at 35 to 40 per cent of capacity. Independent producers are running at a considerably lower rate. A steel works blast furnace has resumed production. Wheeling district companies are running at about 40 per cent.

Finishing mill schedules in all three districts are moderately higher, but sheet production has shown the greatest increase, now being estimated at about 30 per cent of capacity. Tin plate output has dropped to 40 per cent or less.

The price situation is gradually becoming clarified, with lower levels established on most of the important products. An exception must be made in the case of wire and nails, which are well maintained at advanced levels. Sheet and strip prices are still subject to occasional concessions, but prices on the heavy hot-rolled products are better maintained.

Pig Iron

No improvement in shipments is reported, and active inquiry is lacking. Prices seem to be holding on current

Steel specifications have gained at Pittsburgh.

* * *

Operations also higher. Valley district operating at 35 to 40 per cent.

* * *

Price situation gradually being clarified at existing low levels.

* * *

Scrap market quiet, but retains strength.

* * *

carload business, although some sellers are absorbing the railroad freight surcharge, instead of passing it along to the consumer, as had been expected.

Semi-Finished Steel

A small sale of billets was made during the last week at \$28, Pittsburgh, and slabs are reported to be holding at the same level. Sheet bars, however, are weaker, and some tonnage has been moved at sharp concessions from the nominal market. Forging billets are quotable at \$34, Pittsburgh. Wire rods are well maintained at \$37.

Rails and Track Supplies

The Pittsburgh maker shared in the rail order placed last week by the Erie Railroad. No inquiry for accessories to accompany this tonnage has appeared. The Delaware, Lackawanna & Western is inquiring for 4000 tons of rails, but, contrary to reports, no inquiry from the New York Central has appeared.

Bolts, Nuts and Rivets

Some producers report a slight increase in demand, but prices show no improvement, and operations are at a minimum.

Bars, Plates and Shapes

Inquiry for structural steel and reinforcing bars is beginning to open up slightly. As definite awards are slow in being made, it will be several weeks before mills will benefit from prospective tonnage. A local concern has booked 2500 tons of steel for transmission towers at Safe Harbor, Pa. Inquiry has appeared for a church in Pittsburgh, calling for 500 tons. Pittsburgh mills are also interested in the Detroit Post Office, requiring 9500 tons, on which bids are

to be taken Feb. 15. Demand for merchant bars is still quiet, but automobile tonnage is said to be improving gradually. The same is true of alloy bars.

Prices have been clarified somewhat, with local mills quoting bars at 1.60c., Pittsburgh, in the majority of cases. Larger buyers are generally covered at lower figures which are still available on exceptional tonnages. Plates and shapes are unchanged at 1.50c., Pittsburgh.

Tubular Goods

A New York engineering firm has asked for prices on 200 miles of 20-in. pipe, calling for 35,000 tons of steel, but has not revealed the name of the prospective buyer. Purchase of the material is also said to depend upon completion of financial arrangements now being negotiated. No other actual inquiries are before the trade, but reports of a gas line to run from Montana to the Twin Cities are heard. Demand for pipe in general is very quiet, although orders from jobbers appear to have improved a little. Scarcely any tonnage is coming from the oil fields, but mechanical tubing is more active than it was in December.

Wire Products

Releases during the last week improved somewhat, and new buying is developing in better volume. Mills have completed shipments against old low-priced contracts and are greatly encouraged by the cooperation offered by jobbers in attempting to stabilize the quantity differentials recently introduced on merchant products. The increase in freight rates on Jan. 4 also fitted in well with the quantity differential schedules, as sharp increases were applied to less-carload shipments, thus further penalizing the small tonnage direct buyer and diverting business to distributors. In some territories served by Pittsburgh, the advance in less than carload shipments amounted to more than \$6 a ton. Manufacturers' wire is moving to the automobile industry in slightly better volume, but the other consuming lines are quiet.

Sheets

Production improved considerably last week, with independent companies running at slightly over 30 per cent of capacity, and the industry averaging about 28 per cent. Full finishing mills were engaged at the best rate,

having received heavier specifications from the automobile builders in the previous week. Releases last week held to the recent average, but showed no material gain. Prices are still unsatisfactory, and the weak situation is said to be deterring buyers in some cases. Weakness is appearing mostly in the form of drastic concessions in a few individual cases.

Tin Plate

Failure of the large can companies to allocate their 1932 tonnage has brought some uncertainty to the industry, and production schedules this week are slightly lower. The price situation is also considered unsatisfactory, and credit conditions in the canning industry are forcing can makers to make purchases very conservatively. No change in the official price of \$4.75 a base box, Pittsburgh, has occurred.

Strip Steel

Specifications are gaining, but are still far under normal expectations for the month. Automobile tonnage is depressed by the lack of buying by the Ford Motor Co., but is reaching mills in fair volume from other sources. Operations are up a little from last week's level, but still average little more than 20 per cent for the industry as a whole. Prices have not shown further weakness in the last week, and range from 1.40c. to 1.45c., and 1.50c. to 1.55c. on hot strip, and 1.95c. to 2.05c., Pittsburgh, on cold-rolled material.

Coke and Coal

Dealers reported a gain in practically all lines of activity last week. Many users of foundry coke placed tonnage which ordinarily comes in December, and there was an improvement in shipments of water gas fuel. Colder weather also stimulated demand for heating coke, and this was extended to the coal industry. Prices show no change, with furnace coke quoted at \$2.25, Connellsburg, and the foundry grade at \$3.25 to \$4.50.

Old Material

One consumer is reported to have bought a small tonnage of scrap in the last week, but the market has generally been quiet. Prices paid for No. 1 heavy melting steel and hydraulic compressed sheets were within recent price ranges on these products. The market still retains considerable strength. Dealers are paying as high as \$10.35 to cover a recent \$10.50 order for steel and are having difficulty getting first-grade material at that price. With steel ingot operations improving gradually, outlets for scrap are more numerous and the supply is not being enlarged. One dealer is reported to have paid a rather high price for hydraulic bundles in Detroit for shipment to a Pittsburgh district mill, which is ordinarily supplied locally. A recent sale of blast furnace material reestablishes the present quotations.

Coast Distributors Make Sharp Concessions on Concrete Bars

Reinforcing Steel Awards Total 1375 Tons—Coast Imports of Foreign Steel Are Increasing

SAN FRANCISCO, Jan. 18.—A rapidly growing number of reinforcing bar contractors in southern California are reported to have driven down quotations on erection and bar supply contracts until as low as \$1.90 per 100 lb. is now commonly offered for carload lots out of stock. This is 20c. under the mill schedule and 60c. under the warehouse schedule. While these open prices have been confined to the Pacific Southwest, compromise quotations are now reported in the San Francisco market.

Foreign steel tonnage imported at Pacific ports in November was reported larger than in the preceding month. The West Coast continues to absorb 40 per cent of all bars and structural shapes received in the United States, and 50 per cent of all nails and wire.

During the coming month the Navy Department at Washington will open bids on seven major projects for construction in the Far West and in Hawaii, involving an estimated expendi-

ture of over \$1,000,000, and requiring from 4000 to 5000 tons of steel. These include structures, tanks, a water and sewage system at the Sunnyvale dirigible base, floating cranes and a battery building at Mare Island yard, an aircraft shop at Pearl Harbor, Hawaii, and a concrete wharf and trestle at the West Loch ammunition depot in Hawaii.

Reinforcing bars were active during the week, with 1375 tons placed on major open contracts and with new inquiries totaling more than 3000 tons, including 1500 tons for Pasadena's Pine Canyon dam on the San Gabriel River near Azusa. Lettings of structural shapes took 600 tons, and 500 tons of new work came into the market. Plate contracts totaled 300 tons. Bids were opened for 620 tons of cast iron pipe, but less than 100 tons of new inquiries appeared. The Southern California Edison Co. is planning a flume project near Porterville for March construction, which will probably require 500 tons of sheets.

Reinforcing Steel

Awards 4000 Tons—New Projects

9200 Tons

AWARDS

Littleton, Mass., 130 tons, Boston & Maine Railroad grade crossing, to Kalman Steel Co.

Waltham, Mass., 105 tons, State hospital unit, to Barker Steel Co.

Whitehall, N. Y., 170 tons, grade crossing elimination for Delaware & Hudson Railroad, to Kalman Steel Co.

Attica, N. Y., 700 tons, State prison building, to Carnegie Steel Co. through an unnamed distributor.

Washington, 108 tons, addition to Naval Observatory, Bellevue, D. C., to Kalman Steel Co.

State of Missouri, 1500 tons, road work, to Sheffield Steel Co. and Laclede Steel Co.

San Benito County, Cal., 254 tons, State highway structures, to Soule Steel Co.

Martinez, Cal., 100 tons, Hall of Records, to Soule Steel Co.

Stockton, Cal., 136 tons, post office, to Pacific Coast Steel Co.

Prosser, Wash., 105 tons, canal for Yakima Federal reclamation project, to an unnamed bidder.

Long Beach, Cal., 100 tons, Public Utilities Building, to Blue Diamond Corp.

San Jose, Cal., 300 tons, science building, at State Teachers College, to Concrete Engineering Co.

State of Arizona, 113 tons, Wickenburg highway bridge, to an unnamed bidder.

Los Angeles County, 134 tons, Pacoima Dam, to Blue Diamond Corp.

NEW REINFORCING BAR PROJECTS

Melrose, Mass., 350 tons, high school, previously reported as 200 tons.

Brooklyn, 100 tons, sewer project.

Washington, 550 tons, foundations for Archives building; Frederick L. Cranford, Inc., Brooklyn, low bidder for general contract.

Cincinnati, 100 tons, building for Hamilton County tuberculosis sanitarium.

Moline, Ill., 5000 tons, locks and dam on Mississippi River; S. A. Healy, Detroit, general contractor.

Chicago, 200 tons, Illinois Bell Telephone Co. exchange building; Lundoff Dicknell Co., general contractor.

State of Illinois, 800 tons, road work.

Springfield, Mo., 300 tons, hospital.

St. Louis, 140 tons, west approach to municipal bridge.

Hot Springs, Ark., 1000 tons, superstructure for Army and Navy Hospital, bids open Jan. 20.

Upland, Cal., 149 tons, Lemon Growers storage warehouse.

Seattle, 719 tons, University bridge approaches.

Los Angeles, 175 tons, Venice and West Boulevard grade crossing.

Leavenworth, Kan., 400 tons, Veterans' hospital; J. A. Holpuch, general contractor.

Railroad Equipment

Alabama & Western Florida is inquiring for one 50-ton oil-electric locomotive.

North American Car Corp. has ordered four 4500-gal., three 6000-gal. and two 6500-gal. tank cars from American Car & Foundry Co.

Cudahy Packing Co., Chicago, has ordered steel parts for 25 underframes.

Burlington is in the market for 50 mine car bodies.

Chicago Mills Aided by Influx of Small Orders and Operations are Higher

CHICAGO, Jan. 19.—Steel mill operations are at 25 per cent of capacity as the result of an influx of small orders, some of which are for stock replenishment and others for immediate consumption. This gain is significant for the reason that no rails are now being produced and rail specifications are not being counted on for schedules in the coming week. Increased consumer interest is rather general, as reflected in both sales and releases, which, for the second week, have climbed upward.

Increase in the use of bars is impressive in comparison with sluggish plate and structural shape markets. One bar mill unit is producing at 50 per cent of capacity.

More support for the steel market can be expected from railroad shops, where the number of men employed is gradually gaining. Very moderate growth in farm implement manufacture is noted. The outlook for this industry is not encouraging either as to home or foreign markets. Fabricators report that it has been many years since shop operations have been so low and, as gaged by jobs being estimated, there can be little improvement in the near future.

Pig Iron

Shipments of Northern foundry iron are slowly climbing, and there is now assurance that the January movement will exceed the total in December. A spurt in shipments at the year-end, resulting from an effort by consumers to take advantage of the old freight schedule, made December shipments higher than had been expected, and therefore the change in melt, which quite evidently is in progress, is not clearly defined by current shipments. Some iron is now moving to railroad equipment foundries and some pick-up in malleable iron casting production is noted. Southern iron is quiet at the new price of \$10 a ton, Birmingham, or \$16.14 a ton, delivered all rail to Chicago. Charcoal iron producers have withdrawn the prices quoted at Chicago and Milwaukee docks. Quotations are now \$20 a ton, furnace. Silvery is dull and prices are irregular.

Reinforcing Bars

New business is developing very slowly. Estimators are engaged for the most part on small projects. It is

Steel ingot output of Chicago district rises to 25 per cent.

* * *

One bar mill unit able to run at 50 per cent of capacity.

* * *

New sales and contract specifications gain. Pig iron shipments also increasing.

* * *

Heavy melting scrap in better demand, but price declines.

* * *

reported that the general contract on the Mississippi River dam and lock work has been awarded. Prices still lack tests. Not all quotations made prior to the advances have been withdrawn, as had been expected.

Wire Products

January shipments are showing moderate increase over those of December, and specifications indicate that the movement is gradually growing. New business is coming from most classes of users, with no one outlet showing marked improvement. Prices are holding well. Road building programs give promise of a good movement of reinforcing mesh in the spring. Demand for copper wire is light both from the manufacturing and utility groups.

Cast Iron Pipe

Two large inquiries, one from Milwaukee and the other from Minneapolis, constitute the bulk of activity in this commodity. A number of municipalities are willing to go ahead with new undertakings, but financial obstacles stand in the way. Dullness of the market and extreme competition on every inquiry that makes its appearance have an unfavorable reaction on prices. Sellers are aiming at \$33 a ton, Birmingham, on 6 in. and larger pipe, but this figure is seldom realized.

Structural Material

Fresh inquiries call for 5000 tons for highway bridge work in Texas, Minnesota and Wisconsin. Contrary to the trend in this market, there is a call for 700 tons of steel for an apartment building at Evanston, Ill. Bids

have been opened on 1000 tons for a post office and bids will be opened on a similar project in a few days. The general contract has been let for the locks and dam on the Mississippi River at Moline, Ill., and bids will be opened Jan. 27 on the 4000 tons for the Mannheim Road viaduct. Justice Park, Ill., fabricating shops are operating on light schedules.

Rails and Track Supplies

The Erie has placed 19,000 tons of rails with Carnegie, 6000 tons with Illinois and about 6000 tons was divided between Bethlehem and Inland. Mills here are inclined to believe that the New York Central inquiry will be substantially less than the reported 175,000 tons. Both local mills are idle, though they still have orders against which they hope to get releases in the spring.

Plates

Transactions are confined to a few odd lots, several of which are for tank work. The 2000 tons of steel needed for the Northern Pacific cars is yet to be placed. Otherwise the railroad equipment market is at a standstill. Tendencies in railroad shop operations vary. Some railroads are calling men to work and others are shortening hours of work.

Bars

If demand for bars can be taken as the bellwether of the steel market, better things are in store for local mills. Replenishment of depleted stocks and wider use in manufacturing is bringing about a substantial increase in demand for mild steel and alloy steel bars. One producing unit reached 50 per cent of capacity recently, and it will hold that rate throughout this week. The course of demand from farm equipment manufacturers is somewhat uncertain, though undiminished at this time. Operating schedules at rail steel bar mills are gradually growing heavier and inquiries are more promising than at any time in several months. Spring terms are being announced on fence post, but the movement is very light.

Warehousing Business

Structural and boiler rivets are being marked down to 3.75c. a lb. General demand remains light.

Sheets

Business is spotty. Hot mills operating a few days each week are not

producing above 20 per cent of capacity. Demand from jobbers is light, and the roofing trade is dull. Inland Steel Co. has turned over several of the stands in its new mill.

Old Material

Heavy melting steel is being taken by local mills at \$7 to \$7.50 a gross ton, delivered, in one of the most active weeks in several months. One mill took 10,000 tons of steel and another has ordered a sizable quantity of cast wheels. Cast grades for foundry use are also moving better. Prices for brake shoes are up because of increased demand and scarcity of this grade. Freight rates to Indiana Harbor and to Gary are now the same, and consumers at these points are now competitive in the movement of scrap.

Cincinnati Pig Iron Melt Still Low

CINCINNATI, Jan. 19.—The \$1 a ton reduction on Southern iron a week ago failed to stimulate demand, and bookings of Southern furnaces the past week totaled only a few hundred tons. A purchase by an undisclosed central Ohio buyer of 550 tons of Northern iron raised total sales to about 1350 tons. The melt is still low, and no change appears imminent. An inquiry from a southern Ohio consumer for 1000 tons of Northern foundry iron comprises the pending business.

Finished Steel

A small improvement in automotive demand brought new business of district sheet mills to near 40 per cent of capacity output. Other sheet consuming industries are steadily in the market for small current requirements, but future business is negligible.

Old Material

Except for the movement of a small amount of No. 2 steel on contract, shipments of scrap are slow. Prices are nominal.

Ryerson Buys Buffalo Steel Business

Joseph T. Ryerson & Son, Inc., has purchased the stock and good will of the steel department of H. D. Taylor & Co., Buffalo, effective Jan. 15. The stocks taken over by Ryerson include hot and cold-rolled bars, shapes, plates, sheets, etc. Ryerson plants are now established in Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia and Jersey City.

H. D. Taylor & Co. will continue to serve the trade through their enlarged hardware and mill supply divisions.

Birmingham Pig Iron Reduced \$1 a Ton for Southern Delivery

Decline Follows One of Like Amount on Northern Shipments—Steel Operations Gain

BIRMINGHAM, Jan. 19.—A reduction of \$1 was made last week by pig iron producers in this district and the new price for No. 2 foundry in the local market is \$11. Quotations in the North are now based on \$10. The change has had very little effect as yet on buying. Current business continues to develop slowly and in small lots. Shipments have improved slightly, as plant operations return to pre-holiday schedules, and total tonnage for this month is larger than for the same period in December. Foundries are still operating on intermittent schedules, while pipe plants are not yet back to the same rate of operations as before Christmas. Six furnaces are in blast, only two of which are being operated by merchant producers. There has been no change since the first of the year.

Finished Steel

There is a lack of large orders, but routine business continues to develop at a moderate rate, and current book-

ings are somewhat ahead of those of preceding weeks. Inquiries are also improved. A fair demand continues for sheets. A few changes have been made in price quotations, No. 24 hot-rolled annealed now ranges from 2.45c. to 2.55c. No. 24 galvanized ranges from 3c. to 3.05c. Demand for wire products is fair, with the most active buying coming from the retail and jobbing field. A further increase in open-hearth operations occurred last week, a total of 12 having been active as compared with 11 the preceding week. The Tennessee company increased from five to six at Ensley and continued four at Fairfield. Gulf States Steel is running two at Alabama City.

Old Material

Shipments to foundries have improved a little, while those to steel mills are about the same as for the past three weeks. Prices are unchanged.

New England Pig Iron Sales Only 660 Tons; Dutch Iron Offered at Low Prices

BOSTON, Jan. 19.—Pig iron sales for the week were 660 tons. A Massachusetts textile machinery manufacturer, recently mentioned as having taken 2000 tons of Dutch iron, has actually bought 3000 tons, which was delivered in one lot. A car of No. 1X Dutch iron has been delivered at Bridgewater, Mass., at \$17.50 a ton, delivered, leaving about 1950 tons of the 5050 tons of Dutch iron landed at Providence, R. I., a fortnight or so ago still on dock. The Dutch iron representatives have exclusive pig iron Providence dock privileges, pay 20c. a ton unloading charge, and 5c. a ton a month storage rate. Indian iron, of which 135 tons was sold the past week, is now \$17 to \$18 a ton, on dock Boston, duty paid, a decline of \$3 to \$3.50 a ton, made possible by the drop in sterling exchange. Alabama iron has dropped to \$10 a ton, base furnace. Of the 660 tons sold the past week, 325 tons was Buffalo iron.

Old Material

No material change in market conditions is noted. Brokers have few orders to fill for eastern Pennsylvania

and Pittsburgh delivery, and the buying by the American Steel & Wire Co., Worcester, Mass., of No. 1 heavy melting steel and bundled skeleton is on a limited scale.

Detroit Scrap Prices are Slightly Stronger

DETROIT, Jan. 19.—Although scrap transactions in this district have been light, the market has felt the favorable influence of increased activity at Youngstown and Pittsburgh. Some items, including heavy melting steel, have advanced 25c. a ton. Dealers are the most cheerful in several months.

Norton Co., Worcester, Mass., has received an order for 40,000 porous plates to be used in a \$5,000,000 sewage disposal plant to be erected on Ward's Island, New York. The plates will weigh 440,000 lb. They will be made of bonded aluminum.

Cleveland Mills Find Orders a Little More Numerous

Ingot Operations Continue at 35 Per Cent—Pig Iron Market More Active—Sheet Prices Still Weak

CLEVELAND, Jan. 19.—Small lot orders for finished steel were fairly plentiful the past week, although the tonnage sold did not hold up to that of the previous week. Demand was better for steel bars and hot-rolled strip than for other products. The improvement in steel business in this territory this month over December is almost wholly in tonnage from motor car manufacturers and plants that serve that industry. Demand from metalworking shops in other fields shows no revival. There is very little activity in the building field and no new inquiry is coming from the railroads.

Cleveland steel plants are maintaining their recent slight increase in operations, running at 35 per cent of ingot capacity, or the same as during the previous two weeks.

The pig iron market has become more active. While foundries of some of the buyers have not become busier, they are anticipating future needs.

There is little change in the price situation. Further weakness has developed in light cold-rolled sheets. Auto body sheets are now commonly quoted at 2.90c.

Fluorspar producers have adopted uniform delivered prices and made an advance of approximately \$2 a ton.

Pig Iron

Greater activity was displayed the past week than for several months, both locally and in the outlying territory. A northern Ohio foundry purchased around 2500 tons of malleable iron and a Cleveland maker of heating equipment placed a round tonnage of foundry iron covering its first quarter requirements. A Lake furnace that did not participate in the business in this immediate territory sold 5000 tons, its largest contract being for 1500 tons. Inquiries pending include a 1000-ton lot for an Indiana melter. A leading producer reports a 15 per cent gain in shipments this month over December, and other furnaces are shipping more iron than last month. The increased demand is largely from the motor car industry. Prices are unchanged at \$15 to \$15.50, Cleveland, for foundry and malleable iron for outside shipments and \$16 for local delivery. The reduction on Southern foundry iron has brought out some business in this territory in competition with Northern iron.

Iron Ore

Consumption of Lake Superior ore in December was 1,229,640 tons, a decrease of 81,572 tons, compared with 2,338,824 tons in December, 1930. Total amount consumed during 1931 was 24,114,753 tons, against 45,192,180 tons in 1930. Central district furnaces last year consumed 12,169,865 tons, against 22,463,423 tons in 1930. Eastern furnaces consumed 11,548,100 tons, compared with 20,937,960 tons in the previous year. All-rail furnaces melted 259,873 tons, against 994,273 tons the year before, and Eastern furnaces consumed 136,915 tons, against 796,524 tons in 1930. Furnace stocks Jan. 1 were 32,139,074 tons and the amount at furnaces and Lake Erie docks on that date was 38,010,275 tons, against 38,948,675 tons on Jan. 1, 1931. Central district furnaces in December melted 590,370 tons, a decrease of 100,865 tons; Lake front furnaces used 620,145 tons, an increase of 17,999 tons; all-rail furnaces melted 14,325 tons, an increase of 6576 tons, and Eastern furnaces consumed 4800 tons, a decrease of 5282 tons. There were 51 furnaces using Lake ore in blast Dec. 31, a decrease of 12 for the month.

Sheets

Activity in this territory was rather light the past week, buying having been confined to small lots for early needs. Not much business was placed by the motor car industry in Michigan. Most prices are holding to recent quotations. Many of the orders for hot-rolled annealed sheets are being taken at 2.25c., although a 2.15c. price is being named for good lots. Shading to 2.75c. is reported on light cold-rolled sheets, which go to the motor car industry. Steel furniture sheets have not been affected by the recent weakness in other grades. Auto body sheets seem to have settled to 2.90c. and galvanized to 2.80c.

Strip Steel

A fair amount of small lot business in hot-rolled strip continues to come from manufacturers of automobile parts. Prices are steady at 1.45c., Pittsburgh, for wide and 1.55c. for narrow material, with good lots going at \$1 a ton lower. Cold-rolled strip is quiet and unchanged.

Fluorspar

Producers have changed the method of quoting gravel and lump fluorspar, now naming for shipment to the Central Western consuming plants a de-

livered price based on the freight rate from the mines to Pittsburgh. Under this plan all consumers in the territory affected will pay a uniform delivered price. The new quotation for gravel fluorspar is \$20.31, delivered, or some advance over recent prices. Lump material is unchanged.

Bars, Plates and Shapes

There is a fair volume of small-lot orders, largely in bars, which are going mostly to the automotive industry. Structural inquiry is very light. The Youngstown Post Office, 450 tons, has been placed. A highway bridge near Willoughby will take 275 tons. While plates and shapes are unchanged at 1.50c. to 1.60c., Pittsburgh, a firmer price tendency is shown on these products, and small-lot buyers are finding it more difficult to purchase at the lower price. Steel bars are unchanged at 1.55c., Cleveland. Through a typographical error they were quoted at \$1 a ton lower in this report last week.

Rails

Erie Railroad rails for 1932, amounting to 31,377 tons, have not been definitely allocated, although, according to the present schedule, 25,102 tons will go to the Carnegie and Illinois steel companies and the remainder to other mills.

Old Material

A Cleveland mill, after long suspension, resumed taking blast furnace scrap this week, resulting in an advance of \$1.00 a ton on borings and turnings and 50c. a ton on No. 2 busheling. Prices on these grades recently had been based on scrap for shipment to the Youngstown district. Other prices are unchanged.

Canadian Industry Still Sluggish

TORONTO, Jan. 18.—There is no indication of early improvement in the Canadian iron and steel industry. Most plants are operating at about 25 per cent of capacity on spot orders.

Pig Iron

There was a slight spurt in sales during the week, entirely due to the fact that a number of melters were out of stock and forced into the market for iron for immediate consumption. Two stacks are in service. Pig iron prices are unchanged.

Structural Steel

The past week has brought indications of improvement in this market. Several large contracts are pending.

Old Material

Occasional orders are being closed, all are for spot delivery. Steel scrap is sluggish, most of the new business being in iron grades. Price lists are unchanged.

Eastern Pennsylvania Trade Shows Mild Improvement

Steel Mill Operations Gain a Little But Average Only 18 Per Cent—Some Scrap Grades Lower

PHILADELPHIA, Jan. 19.—Mild improvement has developed in this market during the past week. Steel works operations have been stepped up to about 18 per cent. The slight betterment is mostly in orders for plates, shapes and bars. The tonnage largely represents requirements for repair work, and it remains to be seen whether the improvement continues. Hope is felt that the railroad wage situation will be straightened out satisfactorily. If so, it is believed carriers will come into the market for rails and other needed requirements.

Small lots of pig iron are moving at unchanged prices. Scrap has weakened, some grades having declined 50c. to \$1 a ton. A number of small inquiries for new building projects are interesting mills and fabricators.

Pig Iron

A few sales of pig iron ranging from carlots to 150 tons have been made. Prices are unchanged. Southern iron is not penetrating this district to any extent. Tonnages have entered nearby districts at the new level of \$10, base Birmingham. Stocks in yards are gradually being reduced in the absence of merchant operations.

Plates, Shapes and Bars

Miscellaneous and somewhat increased orders have been placed. It is reported that an inquiry for several locomotives is about to come out. The inquiry of the American Scantic Line for repairs for four boats involves about 500 tons of plates, shapes and castings. The Sun Shipbuilding contract for Government dredges, it develops, will call mostly for machinery repairs and only a small lot of steel. A number of projects are out. Bids have been taken on the WCAU radio station and Woolworth store, calling for 600 tons.

Sheets

Automobile body builders are well engaged on new models, and a slightly better tone has been reflected in sheets. The market, however, is dull. The new business has not been sufficient to stimulate production very much. Prices are unchanged and have not been well sounded out. Should the betterment in the automotive demand continue, the trade thinks prices may develop a firmer tone.

Old Material

Small movements of a number of grades have gone at reduced prices.

Declines range from 50c. to \$1. The extreme dullness of the market has been the principal cause for the lower levels. Mills are taking only small lots.

Imports

In the week ended Jan. 16, the following iron and steel imports were

received at Philadelphia: Pig iron from England, 100 tons; spring steel strips from England, 3 tons; steel bars from France, 40 tons, and from Belgium, 50 tons; steel bands from Belgium, 19 tons, and from France, 10 tons; structural shapes from Belgium, 31 tons, and from Germany, 20 tons.

Warehouse

Inquiries coming to warehouses are light. Galvanized sheets have declined \$5 a ton. The new price is 3.75c. for No. 24 gage for 50 bundles and over. For 10 to 49 bundles the level is 4c., and for one to nine bundles, 4.25c. Respective levels for hot-rolled annealed, base, are 3.40c., 3.65c., and 3.90c.

St. Louis Steel Plant Operations Gain Slightly But Rate Is Still Very Low

ST. LOUIS, Jan. 19.—The \$10 price on Southern pig iron at Birmingham has resulted in no new business of consequence here, although prospective customers are said to have been diligently canvassed. The St. Louis Gas & Coke Corp. continues to quote a nominal price of \$17.50, f.o.b. Granite City, for its product, but it is meeting competition wherever conditions justify it.

Both new business and schedules against contracts have subsided somewhat since Jan. 4, when the increase in freight rates became effective. Melters are reported to be more cheerful, and there is talk of some business being placed shortly. Implement makers in the St. Louis trade territory appear to be most active. Stove foundries still are idle, but expect to resume operations shortly on gas ranges. Jobbing foundries are doing little.

Finished Steel

With two additional open-hearth furnaces started today and one last week, there are now four in operation in the St. Louis district or approximately 14 per cent of the total.

The only award of structural steel of the week was 600 tons to Stupp Brothers Bridge & Iron Co. for Missouri highway bridge. Fabricators in the district are said to be operating at about 20 per cent of capacity, with no sizable local projects in sight. The only reinforcing bar project before the trade is 140 tons for an approach to the municipal bridge.

Granite City Steel Co. reports that incoming business so far in January has been considerably in excess of the corresponding period the preceding month, resulting in a corresponding increase in shipments, despite the recent reduction in prices of sheets.

Old Material

This week will wind up the last of the orders for melting steel heretofore placed with dealers by mills in the St. Louis district, leaving dealers with no orders on their books. Mills have given no indications as to when they will resume buying. A leading interest started up two open-hearth furnaces, but its stock of scrap is sufficient for the present. A rolling mill resumed operations without further buying of scrap. Locomotive tires and miscellaneous standard-section rails are off 50c. and 25c. a ton respectively, but all prices are nominal on account of the lack of buying. Railroad lists: Chesapeake & Ohio, 17,510 tons of scrap and 850 tons of dismantled equipment; Chicago, Burlington & Quincy, 8,295 tons.

December Was Poor Month in Building

The 1931 total for all types of construction in the 37 States east of the Rockies amounted to \$3,092,849,500 in actual contracts awarded, according to the F. W. Dodge Corp.

The year's final quarter produced a contract total of \$530,141,700. Of this amount, December accounted for \$136,851,600, or 26 per cent, of the total for the quarter. Contract awards in the final quarter of 1930 aggregated \$839,715,600.

Union Pacific has recalled 4000 men for locomotive repair work at Los Angeles, Omaha, Portland, Denver, Cheyenne and Pocatello, where operations will be resumed on a four-day-a-week basis, three weeks a month.

Tin Plate Contracts Delayed; New York Business Is Dull

Very Little, If Any, Improvement in Eastern Steel Bookings—High Freight Rates for Less-Carloads

NEW YORK, Jan. 19.—No improvement in finished steel business has occurred in this district in the past week; in fact, orders of some companies were not as plentiful as in the week before. There was disappointment because of the failure of the American Can Co. and the Continental Can Co. to place their annual contracts. These companies issued some releases for early rolling, but it is said that the formal contracts will not be placed until after the canners' convention in Chicago next week.

Railroad business is very light. There are expectations that the New York Central will come into the market soon for its 1932 rail requirements, which, it is expected, will not exceed 100,000 tons. The amount bought for 1931 use was about 175,000 tons.

The price situation is still very uncertain, particularly in sheets. No. 24 hot-rolled annealed sheets are now quite generally available to the larger buyers at 2.15c., with 2.25c. applying on small-lot business. Some sales of galvanized sheets have been made at 2.75c., though most producers are quoting 2.80c.

Buyers of steel are discovering that the recent sharp advance in freight charges on less-carload lots offers an inducement to buy in carloads when possible. Although the carload rate from Pittsburgh to New York advanced only 2c. per 100 lb., or from 33c. to 35c., the less-carload rate is now 54c., whereas it formerly was 39c. The less-carload rate from Pittsburgh to some New England points is now 61c., whereas the carload rate is 39c. The advance in the Pittsburgh-New York less-carload rate amounts to \$3 a ton. Thus, if a steel buyer were to place three 10-ton orders, he would pay a total less-carload freight charge of \$324, whereas if he were to make up a 30-ton carload order, the charge would be \$210, or \$114 less. Steel companies believe that the result of this wide spread in freight charges will be a diversion of many small orders to warehouses. Some shipments from Pittsburgh have recently been made on a commodity rate, not frequently used heretofore, which is only 42c. per 100 lb. for less-carloads, but this rate may be withdrawn.

Pig Iron

Open inquiry for pig iron is virtually absent. With general business

prospects still uncertain, consumers are adhering to a hand-to-mouth policy of buying. New purchasing is further curtailed by contracts, made in 1930 and 1931, against which shipments are still being made. However, with those orders nearing completion

and with foundry stocks of iron barely sufficient to satisfy current melts, an increased demand is expected in the near future. Sales in the past week aggregated only 1500 tons, compared with 2000 tons in each of the two preceding weeks. Prices are unchanged.

Old Material

Activity in the past week was practically at a standstill. Deliveries of hydraulic bundles to Bethlehem, Pa., have been temporarily suspended. Nos. 1 and 2 grades of heavy melting steel are still being stored on barges in New York harbor for spring shipment to Buffalo.

Buffalo Steel Operations Are Lower This Week

BUFFALO, Jan. 19.—Conditions in the pig iron market are unchanged. Foundry operation averages about 25 per cent of capacity.

Finished Steel

The Lackawanna plant of Bethlehem Steel has reduced its open-hearth operation to four. The Republic plant will be idle this week. Wickwire Spencer has reduced its open-hearth operation to one unit. Seneca Iron & Steel Co. and Buffalo Bolt Co. are operating at 25 to 30 per cent.

Old Material

Dealers are complaining that the present freight rates make shipment of scrap from certain points almost prohibitive. In one case, a certain grade of scrap was bought by a dealer for \$1 a gross ton, f.o.b. cars, and \$4 was paid for transportation. With the outside markets strengthening, Buffalo dealers expect soon to be able to ship to Pittsburgh, particularly if the price continues to drop here. Sales of No. 1 machinery cast are reported at \$9.50, and it is reported that 600 or 700 tons of stove plate was bought for \$8.60.

Vote Stresses Security for Regular Workers

Voting upon suggested measures to minimize the effects of future business depressions, 524 New England business leaders have expressed to the New England Council the belief that each employer should accept definite responsibility for providing maximum possible security of employment for his stable working force. Reserves to help maintain the income of stable forces during slack times were favored by 323 business men and opposed by 207. The opinion of New England executives is strongly

opposed to compulsory employment insurance.

Among plans suggested for stabilizing production, those most favored were sales estimating and forecasting, and the budgeting of sales, production and financing. Shortening weekly hours to conform to work available was advocated by 484 executives and opposed by 70.

A total of 71 executives favored restriction of the use of machinery in order to increase employment, while 545 opposed such a measure. Vocational guidance by schools, colleges and universities away from decadent industries was advocated by 511. A large majority of the executives favored reserving public works construction for depression periods, and requiring all banks in each Federal Reserve District to become members of the Federal Reserve System.

Drop Forge Institute Elects Officers

The American Drop Forge Institute held its annual meeting in Cleveland, Jan. 15, with an attendance of about 50. C. H. Smith, president, Steel Improvement & Forge Co., Cleveland, and E. R. Bishop, president, Globe Forging & Foundries Co., Syracuse, were re-elected president and vice-president respectively. J. B. Sehn was elected secretary and treasurer, adding the duties of these positions to his activities as cost accountant of the institute.

Doehler Buys New Haven Company

Doehler Die Casting Co., New York, has purchased from National Lead Co. all equipment, inventories and good will of Newton Die Casting Corp., New Haven, Conn. Most of this equipment will be moved to the Doehler company's Pottstown, Pa., plant.

Fabricated Structural Steel

Awards of 17,175 Tons Include 4500 Tons for Bridges—New Projects of 25,000 Tons

STRUCTURAL steel awards the past week, at 17,175 tons, are the second largest since Nov. 5. Lettings include 4500 tons for bridges in Illinois and Indiana, 2675 tons for Columbia University library in New York and 1000 tons for a New York public school.

New projects of 25,000 tons are also the heaviest for several weeks. Of this total 9500 tons is for a Post Office in Detroit and 3000 tons for bridges in Wisconsin. The University of Montreal will require 3000 tons for a new building, and a school in Toronto will take 1000 tons. Awards follow:

NORTH ATLANTIC STATES

Fall River, Mass., 155 tons, hospital and Nurses' Home, to John E. Cox Co., Fall River.
Waverly, Mass., 148 tons, hospital unit, to an unnamed fabricator.
Waltham, Mass., 100 tons, medical and surgical building, to Boston Bridge Works, Inc.
New York, 445 tons, highway bridge in Borough of Queens, to J. Klein Iron Works, Inc.
Peoughkeepsie, N. Y., 573 tons, Hudson River State Hospital, to Lackawanna Steel Construction Corp.
Yonkers, N. Y., 275 tons, sewage treatment plant, to Paterson Bridge Co.
Mount Kisco, N. Y., 140 tons, municipal building, to Harris Structural Steel Co.
New York, 2675 tons, Columbia University library, to McClintic-Marshall Corp.
Attica, N. Y., 430 tons, prison cell block, to Ernst Iron Works, Buffalo.
West Haverstraw, N. Y., 325 tons, Reconstruction Home, to Ingalls Iron Works Co.
New York, 1000 tons, public school No. 95 in Bronx, to Harris Structural Steel Co.
Rochester, N. Y., 250 tons, two units of Monroe County Home, to F. L. Hughes & Co., Rochester.
New York, 900 tons, public schools Nos. 163 and 19, to J. Klein Iron Works, Inc.
New York, 350 tons, public school No. 16, to Eastern Structural Steel Co.
Kearny, N. J., 600 tons, generating plant, Public Service Corp. of New Jersey, to McClintic-Marshall Corp.
Bellevue, Del., 110 tons, Mount Pleasant School, to Bethlehem Fabricators, Inc.

SOUTH AND SOUTHWEST

Lynchburg, Va., 565 tons, armory and market building, to McClintic-Marshall Corp.
Memphis, Tenn., 600 tons, sheet piling, Government Engineers' Depot, to Jones & Laughlin Steel Corp.
Forest City, Ark., 300 tons, municipal work, to Muskogee Iron Works.
Canadian River, Okla., 1000 tons, highway bridge, to Kansas City Structural Steel Co.
Menard County, Tex., 200 tons, highway bridge, to Petroleum Iron Works.
Concho County, Tex., 180 tons, highway bridge, to Petroleum Iron Works.

CENTRAL STATES

Youngstown, 450 tons, post office, to an unnamed fabricator.
Cleveland, 700 tons, sewage disposal plant, to American Bridge Co.
Indiana and Illinois, 4500 tons, bridge work, to Vincennes Bridge Co., and Mississippi Valley Structural Steel Co.
Boyertown, Mo., 600 tons, highway bridge to Stupp Bros. Bridge & Iron Co.; previously reported as 400 tons.

WESTERN STATES

Stockton, Cal., 500 tons, post office, to McClintic-Marshall Corp.
Los Angeles, 100 tons, telephone exchange, to Minneapolis-Moline Power Implement Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Westfield, Mass., 750 tons, State bridge.
New York, 200 tons, vaults for United States Assay office.

266—The Iron Age, January 21, 1932

Fallon, Nev., awarded 168 tons of 12-in. to Pacific States Cast Iron Pipe Co.
Burbank, Cal., awarded 450 tons of 8-in. to American Cast Iron Pipe Co.
El Segundo, Cal., placed 160 tons with American Cast Iron Pipe Co.

Pipe Lines

Brokaw, Dixon, Garner & McKee, Inc., New York, is inquiring for prices on 200 miles of 20-in. pipe, involving approximately 35,000 tons of steel. The name of the client desiring this pipe has not been revealed.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, plans second natural gas pipe line from San Jose to San Francisco and vicinity. Cost over \$750,000.

Water Department, Yakima, Wash., N. A. Gilman, superintendent, plans 24-in. pipe line from Naches Heights reservoir to city districts. Cost \$80,000.

Keystone Pipe Line Co., subsidiary of Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa., is considering extensions in oil pipe line to points in Pennsylvania west of present terminus.

Yount-Lee Oil Co., Inc., San Jacinto Life Building, Beaumont, Tex., let contract to N. A. Saigh Co., Builders' Exchange Building, for 8-in. oil pipe line from Beaumont to High Island, 43 miles, and for 6-in. water line into High Island. Cost about \$90,000.

Limestone Oil & Gas Co., Wilburton, Okla., recently merged with American Gas, Inc., plans pipe line from Wilburton oil pool to Quinton, Okla., and vicinity.

E. G. Grace Says Burden of Taxes Must Be Lifted

"Taxes must come down, the burden of governmental costs must be lightened and budgets must be balanced," said E. G. Grace, president, Bethlehem Steel Corp., at the opening of the three-day annual sales meeting of all the Bethlehem companies at Bethlehem, Pa., Monday.

"Prosperity in the steel business depends in the main on good times throughout all industry," he declared.

"We are all interdependent, and with purchasing power again available and generally used, then and not until then will prosperity return. Purchasing power is created when there is profit, not when costs exceed selling prices of revenues.

"The tax burden is a very serious and prominent item in cost sheets today. The country is rapidly approaching, if it has not already reached, the danger line of financial stability because of the continued delirious extravagance of Federal, State and municipal spending.

"Reduce the tax bill, both of the individual and of business, and you will have taken a long step toward restoring confidence. Taxes will be reduced when the people, as a whole, are made to realize that they are paying for extravagant government administrations."

C. M. Schwab, chairman, also addressed the meeting. Paul Mackall, vice-president in charge of general sales, presided.

Cast Iron Pipe

Portland, Me., has closed bids on 1500 ft. of 8-in.
Woonsocket, R. I., is inquiring for 200 tons of 6 to 20-in.
Borough of Queens, N. Y., awarded 850 tons of 8 and 12-in. to Warren Foundry & Pipe Corp.
Borough of Manhattan has postponed indefinitely award of 700 tons of 6 to 12-in.
Bethlehem, Pa., is opening bids this week on 200 tons of 6 to 12-in.
Washington will open bids Jan. 20 on 5300 tons of 36 and 48-in.; previously reported as 2500 tons.
Minneapolis, Minn., is expected to enter the market for 2000 ft. of 30-in.

Copper Market Inactive, With Price Firm;

Tin and Lead Steady; Zinc Weak

NEW YORK, Jan. 19.—The price of electrolytic copper is firm and unchanged at 7.50c. a lb., delivered Connecticut Valley. Although demand is light, neither primary producers nor custom smelters are pressing to sell at the current level. However, a moderate amount of second quarter buying is still being done.

Copper Exporters, Inc., continues to quote 7.62½c., delivered, c.i.f. usual European ports. Export sales in the first half of January aggregated 12,500 tons, comparing favorably with total export sales in the first half of December. Lake copper is quiet and is still quotable at 7.50c. to 7.62½c., delivered.

Tin

A fair volume of business was transacted in the past week, with sales for spot and early February delivery comprising the bulk of new business, chiefly to consumers. The market continues to be steady, with today's quotation at 22.05c. The London market today is £140 15s. a ton for spot standard, £143 15s. for future standard, £143 10s. for spot Straits. The Singapore quotation today is £146 15s. Shipments from the Straits Settlements in the first half of January amounted to 1750 tons. Stocks of tin in United Kingdom warehouses now stand at 31,868 tons, an increase of 480 tons over the preceding week.

Lead

Demand in the past week has been limited. Although a majority of consumers are covered for January requirements, interest in February commitments is still restricted. Prices are unchanged at 3.75c. a lb., New York, and 3.55c. a lb., St. Louis.

Zinc

Continued weakness in prices is evident. A moderate amount of buying for prompt shipment followed a decline in price from 3.10c., East St. Louis, and 3.42c., New York, to 3.00c., East St. Louis, and 3.37c., New York. Little forward purchasing is being transacted, despite indications that current quotations may apply for February delivery.

Antimony

Activity in this market is virtually dormant. In the absence of business, the price is nominally unchanged at

6c. a lb., duty paid New York, for prompt shipment and about 5.87½c., duty paid, New York, for futures.

Engineers Advocate Public Work Reorganization

The American Engineering Council at its annual meeting in Washington, Jan. 14-16, took steps to align the engineering profession in support of legislation to create an Administration of Public Works, in accordance with the recommendation of President Hoover in his last message to Congress.

The council will work for the enactment of the bill introduced in the House by Representative Cochran of Missouri "to accelerate public construction in periods of business depression through the creation of an

Administration of Public Works and to provide for a more effective coordination and correlation of the public works functions of the Government." A number of amendments to the Cochran measure will be urged upon Congress by the engineers; one of these is placing the design, construction, operation and repair of ferries, barges, hospitals, lighthouses, prisons, storehouses, docks and flood control works under the control of the Administrator of Public Works. Another would enable the Administrator to employ from time to time, by contract, and at the established rates of compensation, outside professional or technical service.

William S. Lee, president of the W. S. Lee Engineering Corp., Charlotte, N. C., and past president of the American Institute of Electrical Engineers, was elected president of the council to succeed Carl E. Grunsky of San Francisco.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 13	Jan. 14	Jan. 15	Jan. 16	Jan. 18	Jan. 19
Lake copper, New York.....	7.62 1/2	7.62 1/2	7.62 1/2	7.62 1/2	7.62 1/2	7.62 1/2
Electrolytic copper, N. Y. *	7.25	7.25	7.25	7.25	7.25	7.25
Straits tin, spot, N. Y.	21.70	22.00	22.25	...	22.15	22.05
Zinc, East St. Louis.....	3.05	3.05	3.00	3.00	3.00	3.00
Zinc, New York.....	3.42	3.42	3.37	3.37	3.37	3.37
Lead, St. Louis.....	3.55	3.55	3.55	3.55	3.55	3.55
Lead, New York.....	3.75	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price 1/4c. higher delivered in the Connecticut Valley.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.00c. a lb., New York.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	24.00c. to 25.00c.
Tin, bar.....	26.00c. to 28.00c.
Copper, Lake.....	9.00c. to 10.00c.
Copper, electrolytic.....	8.75c. to 9.75c.
Copper, casting.....	8.50c. to 9.50c.
Copper sheets, hot-rolled.....	16.62 1/2c.
High brass sheets.....	13.37 1/2c.
Seamless brass tubes.....	16.62 1/2c.
Seamless copper tubes.....	16.12 1/2c.
Brass rods.....	11.12 1/2c.
Brazed brass tubes.....	22.12 1/2c.
Zinc, slab.....	4.75c. to 5.25c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.50c. to 5.00c.
Lead, bar.....	6.25c. to 7.25c.
Lead sheets.....	8.00c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum, virgin, 99 per cent plus.....	23.30c.
Alum, No. 1 for remelting, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, 1/2 and 1/4.....	15.25c. to 16.25c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	26.50c.
Tin, bar.....	28.50c.
Copper, Lake.....	8.62 1/2c.

Copper, electrolytic	8.62 1/2c.
Copper, casting	8.25c.
Zinc, slab.....	4.75c. to 5.00c.
Lead, American pig.....	4.30c. to 4.50c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	29.50c.
Solder, 1/2 and 1/4.....	18.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.75c. 6.50c.
Copper, hvy. and wire	5.50c. 6.25c.
Copper, light and bot-toms	4.50c. 5.25c.
Brass, heavy	2.75c. 3.50c.
Brass, light	2.25c. 3.00c.
Hvy. machine compo-sition	4.25c. 5.00c.
No. 1 yel. brass turn-ings	3.25c. 3.75c.
No. 1 red brass or compos. turnings	3.75c. 4.50c.
Lead, heavy	2.75c. 3.125c.
Zinc	1.25c. 1.75c.
Cast aluminum	3.25c. 5.00c.
Sheet aluminum	9.00c. 11.00c.

Prices of Finished and Semi-Finished Steel,

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	.150c. to 1.60c.
F.o.b. Chicago	.170c.
Del'd Philadelphia	.181c. to 1.91c.
Del'd New York	.185c. to 1.95c.
F.o.b. Cleveland	.155c.
F.o.b. Lackawanna	.160c. to 1.70c.
F.o.b. Birmingham	.170c.
C.i.f. Pacific ports	.200c.

Billet Steel Reinforcing

	Base per Lb.
F.o.b. P'gh mills, 40, 50, 60-ft.	.150c. to 1.60c.
F.o.b. Birmingham, mill lengths	.175c.

	Base per Lb.
F.o.b. mills, east of Chicago dist.	.130c. to 1.35c.
F.o.b. Chicago Heights mill	.150c. to 1.60c.
Del'd Philadelphia	.149c. to 1.59c.

Rail Steel

	Base per Lb.
F.o.b. mills, east of Chicago	.130c. to 1.35c.

	Base per Lb.
F.o.b. Chicago	.150c. to 1.60c.

Iron

	Base per Lb.
Common iron, f.o.b. Chicago	.170c.

	Base per Lb.
Refined iron, f.o.b. P'gh mills	.275c.

	Base per Lb.
Common iron, del'd Philadelphia	.211c.

	Base per Lb.
Common iron, del'd New York	.215c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	.150c. to 1.60c.

	Base per Lb.
F.o.b. Chicago	.170c.

	Base per Lb.
F.o.b. Birmingham	.170c.

	Base per Lb.
Del'd Cleveland	.17035c. to 1.8035c.

	Base per Lb.
Del'd Philadelphia	.16935c. to 1.7435c.

	Base per Lb.
F.o.b. Contesville	.160c. to 1.70c.

	Base per Lb.
F.o.b. Sparrows Point	.160c. to 1.70c.

	Base per Lb.
F.o.b. Lackawanna	.160c. to 1.70c.

Del'd New York	.1798c. to 1.898c.
C.i.f. Pacific ports	.180c. to 1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	.150c. to 1.60c.

	Base per Lb.
F.o.b. Chicago	.170c.

	Base per Lb.
Del'd Philadelphia	.181c. to 1.91c.

	Base per Lb.
Del'd New York	.185c. to 1.95c.

	Base per Lb.
F.o.b. Cleveland	.155c.

	Base per Lb.
F.o.b. Lackawanna	.160c. to 1.70c.

	Base per Lb.
F.o.b. Birmingham	.170c.

	Base per Lb.
Del'd Cleveland	.17035c. to 1.8035c.

	Base per Lb.
Del'd Philadelphia	.15995c. to 1.6495c.

	Base per Lb.
Del'd New York	.176775c. to 1.8675c.

	Base per Lb.
C.i.f. Pacific ports (standard)	.205c.

	Base per Lb.
C.i.f. Pacific ports (wide flange)	.215c.

Alloy Steel Bars

(F.o.b. maker's mill)

	Alloy Quantity Bar Base, 2.65c. per Lb.
S.A.E.	Alloy
Series	Differential
Numbers	per 100 Lb.
2000 (1 1/2% Nickel)	\$0.25
2100 (1 1/2% Nickel)	0.55
2300 (3 1/2% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	0.70

5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is $\frac{3}{4}$ c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than $2\frac{1}{2}$ in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

Base per Lb.

Bars, f.o.b. Pittsburgh mill	2.00c.
Bars, f.o.b. Chicago	2.00c.
Bars, Cleveland	2.00c.
Bars, Buffalo	2.00c.
Shafting, ground, f.o.b. mill	*2.35c. to 3.30c.

*According to size.

Sheets, Strip, Tin Plate, Terne Plate

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	.160c. to 1.65c.

	Base per Lb.
No. 10, f.o.b. Chicago mills	.175c. to 1.80c.

	Base per Lb.
No. 10, del'd Philadelphia	.191c. to 2.01c.

	Base per Lb.
No. 10, f.o.b. Birmingham	.175c. to 1.85c.

	Base per Lb.
No. 10, c.i.f. Pacific Coast ports	.235c.

	Base per Lb.
No. 10, f.o.b. Pittsburgh	.175c. to 1.85c.

	Base per Lb.
No. 10, f.o.b. Chicago	.175c. to 1.85c.

	Base per Lb.
No. 10, f.o.b. Birmingham	.175c. to 1.85c.

	Base per

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)
(After Dec. 31, extras of 10c. a 100 lb. on mixed
and joint carloads, 25c. on pool carloads and 40c.
on less than carloads will be applied on all merchant
wire products.)

To Manufacturing Trade
Bright wire 2.20c.
Spring wire 3.20c.
To Jobbing Trade
Base per Keg
Standard wire nails \$1.95

Smooth coated nails	1.95
Galvanized nails	3.90
	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

Woven wire fence, Nos. 9 and 11 gage
per net ton \$55.00
Woven wire fence, No. 12½ gage and
lighter, per net ton 60.00
Anderson, Ind., mill prices are ordinarily
\$1 a ton over Pittsburgh base; Duluth,
Minn., and Worcester, Mass., mill \$2 a ton
over Pittsburgh, and Birmingham mill \$3 a
ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton
Standard, f.o.b. mill \$43.00
Light (from billets), f.o.b. mill 34.00
Light (from rail steel), f.o.b. mill 32.00

Track Equipment

Base per 100 Lb.
Spikes, $\frac{3}{4}$ -in. and larger \$2.60
Spikes, $\frac{1}{2}$ -in. and larger 2.60
Spikes, boat and barge 2.80

Tie plate, steel 1.85
Angle bars 2.75
Track bolts, to steam railroads 3.50
Track bolts, to jobbers, all sizes, per 100
count 73 per cent off list

BOLTS, NUTS RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or
Chicago)
Per Cent Off List
Machine bolts 73, 10 and 10
Carriage bolts 73, 10 and 10
Lag bolts 73, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads 73, 10 and 10
Hot-pressed nuts, blank or tapped, square, 73, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons, 73, 10 and 10
C.p.c. and t. square or hex. nuts, blank or
tapped 73, 10 and 10
Washers* 7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including
 $\frac{1}{2}$ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List
Semi-finished hexagon nuts 73, 10 and 10
Semi-finished hexagon castellated nuts, S.A.E. 73, 10 and 10
Stove bolts in packages, P'gh 80, 25 and 10
Stove bolts in packages, Ch'go 80, 25 and 10
Stove bolts in pkgs., Cleveland 80, 25 and 10
Stove bolts in bulk, P'gh 80, 25, 10 and 2½
Stove bolts in bulk, Ch'go 80, 25, 10 and 2½
Stove bolts in bulk, Cleveland 80, 25, 10 and 2½
Tire bolts 60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts
and nuts apply on carload business with jobbers
and large consumers.

Large Rivets

($\frac{1}{2}$ -in. and larger)
Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland \$2.25
F.o.b. Chicago 2.35

Small Rivets

($\frac{1}{8}$ -in. and smaller)
Per Cent Off List

F.o.b. Pittsburgh 70, 10 and 5
F.o.b. Cleveland 70, 10 and 5
F.o.b. Chicago 70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c
per 100 lb. on lots of 200 lb. or more)
Per Cent Off List

Milled cap screws 80, 10, 10 and 5
Milled standard set screws, case hardened 80 and 5
Milled headless set screws, cut thread 75 and 10
Upset hex. head cap screws, U.S.S. thread 85, 10 and 10
Upset hex. cap screws, S.A.E. thread 85, 10 and 10
Upset set screws 80, 10 and 5
Milled studs 70

SEMI-FINISHED STEEL

Billets and Blooms

Per Gross Ton
Rerolling, 4-in. and under 10-in., Pitts-
burgh \$28.00
Rerolling, 4-in. and under 10-in., Youngs-
town 27.00
Rerolling, 4-in. and under 10-in., Cleve-
land 27.00
Rerolling, 4-in. and under 10-in., Chicago 29.00
Forging quality, Pittsburgh \$34.00 to 35.00

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton
Pittsburgh \$27.00
Youngstown 27.00
Cleveland 27.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton
Pittsburgh \$28.00
Youngstown 28.00
Cleveland 28.00

Skelp

(F.o.b. Pittsburgh or Youngstown)
Per Lb.

Grooved 1.50c. to 1.60c.
Universal 1.50c. to 1.60c.
Sheared 1.50c. to 1.60c.

Wire Rods

(Common soft, base)

Per Gross Ton
Pittsburgh \$37.00
Cleveland 37.00
Chicago 38.00

Coke

Per Net Ton
Furnace, f.o.b. Connellsville
prompt \$2.25
Foundry, f.o.b. Connellsville
prompt 8.25 to 4.50
Foundry, by-product, Ch'go ovens 7.50
Foundry, by-product, New Eng-
land, del'd 10.50
Foundry, by-product, Newark or
Jersey City, delivered 8.70 to 9.10

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa.
mines \$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. 1.50 to 1.60

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate 3.50c.
No. 4 industrial 3.00c.

Per Gal. f.o.b. Baltimore

No. 3 distillate 3.50c.
No. 4 industrial 3.25c.

COKE, COAL AND FUEL OIL

Foundry, by-product, Phila \$0.00
Foundry, Birmingham 5.00
Foundry, by-product, St. Louis,
f.o.b. ovens 8.00
Foundry, by-product, del'd St. Louis 9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa.
mines \$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. 1.50 to 1.60

FLUXES AND REFRactories

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat	Intermediate	Duty Brick	Heavy Duty Brick
Pennsylvania	\$30.00	\$25.00 to \$30.00		
Maryland	38.00	25.00 to 30.00		
New Jersey	\$44.00 to 57.00			
Ohio	38.00	25.00 to 30.00		
Kentucky	38.00	25.00 to 30.00		
Missouri	35.00	25.00 to 30.00		
Illinois	38.00	25.00 to 30.00		
Ground fire clay, per ton		6.50		

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania		\$38.00
Chicago		47.00
Birmingham		50.00
Silica clay, per ton		8.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa.		\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.		40.00

CAST IRON PIPE

Per Net Ton

6-in. and larger, del'd New York \$30.20
4-in., del'd New York 33.20
6-in. and larger, Birmingham \$32.00 to 33.90
4-in., del'd Chicago 43.40 to 44.40

4-in., Birmingham \$35.00 to \$36.00
Class "A" and gas pipe, \$3 extra.

Pig Iron Prices for All Districts

The freight rate advance, effective Jan. 4, increased pig iron tariffs 13.44c. per gross ton; for convenience the delivered prices in the following tables are figured on the basis of 13c. additional.

► VALLEY ◀

Per gross ton, f.o.b. Valley furnace:	
Basic	\$15.50
Bessemer	\$16.00 to 16.50
Gray forge	15.50 to 16.00
No. 2 foundry	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable	16.00 to 16.50
Low phos., copper free	26.89 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

► PITTSBURGH ◀

Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.50
No. 2 foundry	\$16.50 to 17.00
No. 3 foundry	16.00 to 16.50
Malleable	16.50 to 17.00
Bessemer	16.50 to 17.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

► CHICAGO ◀

Per gross ton at Chicago furnace:	
N'th'n No. 2 fdy.	\$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super., charcoal, sil.	16.50
1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sil. 1 to 2, copper free	\$28.50 to 29.20
Silver, sil. 8 per cent.	24.92
Bess. ferrosilicon, 14-15%	31.42

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

► ST. LOUIS ◀

Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., deliv'd. \$14.56 to 15.56	
Northern malleable, deliv'd.	18.80
Northern basic, deliv'd.	18.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

► NEW YORK ◀

Per gross ton, delivered New York district:	
*Buffalo, No. 2, del'd east.	
N. J.	\$17.91 to 18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

► PHILADELPHIA ◀

Per gross ton at Philadelphia:	
East. Pa. No. 2	\$15.64 to \$16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.25
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'rg low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

► BUFFALO ◀

Per gross ton, f.o.b. furnace:	
No. 2 fdy	\$16.00
No. 2X fdy	16.50
No. 1 fdy	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal	23.41

► NEW ENGLAND ◀

Per gross ton delivered to most New England points:	
*Buffalo, sil. 1.75 to 2.25	\$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.24
*Ala., sil. 1.75 to 2.25	15.88
*Ala., sil. 2.25 to 2.75	16.28

Freight rates: \$5.04 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

► CINCINNATI ◀

Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	18.01
S'th'n Ohio silvery, 8 per cent.	22.01

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.81 from Birmingham.

► CANADA ◀

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace	
Per Gross Ton	Per Gross Ton
6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
	11% 12% 13% 14% 15%
	\$21.50 22.50 23.50 25.50 27.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, delivered, in carloads	10.00c.
Ferrochromium, 2% carbon, 17.00c. to 17.50c.	
Ferrochromium, 1% carbon, 19.00c. to 20.00c.	
Ferrochromium, 0.10% carbon, 23.50c. to 25.00c.	
Ferrochromium, 0.06% carbon, 25.50c. to 27.00c.	
Ferrovanadium, del., per lb. contained Va.	\$3.05 to \$3.30
Ferrocobaltitium, 15 to 18% per net ton, f.o.b. furnace, in carloads	16.00c.
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base per gross ton	91.00c.
Ferromolybdenum, per lb. Mo. del.	95c.
Calcium molybdate, per lb. Mo. del.	80c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
Per Gross Ton	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52% 23c. to 24c.	
Manganese, Brazilian, 46 to 48% 22c. to 23c.	
Tungsten, Chinese wolframite	\$11.00 to \$11.25
Tungsten, domestic scheelite	9.50 to 10.00
Per Gross Ton	
Chrome, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$18.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	20.00

Old Material Quotations

► PITTSBURGH ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$10.00 to \$10.50	
No. 2 heavy melting steel.	9.00 to 9.50	
No. 2 railroad wrought.	10.00 to 10.50	
Scrap rails.	10.00 to 10.50	
Rails 3 ft. and under.	12.00 to 12.50	
Sheet bar crops, ordinary.	11.00 to 11.50	
Compressed sheet steel.	9.50 to 10.00	
Hand bundled sheet steel.	9.00 to 9.50	
Hvy. steel axle turnings.	9.00 to 9.50	
Machine shop turnings.	6.50 to 7.00	
Short shov. steel turnings.	6.50 to 7.00	
Short mixed borings and turnings.	6.50 to 7.00	
Cast iron borings.	6.50 to 7.00	
Cast iron carwheels.	10.50 to 11.00	
Heavy breakable cast.	8.00 to 8.50	
No. 1 cast.	9.50 to 10.50	
Railr. knuckles and couplers.	10.50 to 11.50	
Rail. coil and leaf springs.	10.50 to 11.50	
Rolled steel wheels.	10.50 to 11.50	
Low phos. billet crops.	13.00 to 13.50	
Low phos. sheet bar crops.	12.50 to 13.00	
Low phos. plate scrap.	10.50 to 11.50	
Low phos. punchings.	10.50 to 11.50	
Steel car axles.	15.00 to 15.50	

► CHICAGO ◄

Delivered Chicago district consumers:

Per Gross Ton		
Heavy melting steel.	\$7.00 to \$7.50	
Shoveling steel.	7.00 to 7.50	
Frogs, switches and guards.	7.00 to 7.50	
Hydraulic comp. sheets.	5.50 to 6.00	
Drop forge flashings.	5.00 to 5.50	
No. 1 busheling.	5.00 to 5.50	
Rolled carwheels.	8.00 to 8.50	
Railroad tires.	9.00 to 9.50	
Railroad leaf springs.	8.50 to 9.00	
Axle turnings.	5.75 to 6.25	
Steel couplers and knuckles.	8.25 to 8.75	
Coll springs.	9.50 to 10.00	
Axle turnings (elec. fur.).	6.00 to 6.50	
Low phos. punchings.	10.00 to 10.50	
Low phos. plates, 12 in. and under.	9.00 to 9.50	
Cast iron borings.	3.00 to 3.50	
Short shoveling turnings.	4.00 to 4.50	
Machine shop turnings.	4.00 to 4.50	
Rerolling rails.	10.50 to 11.00	
Steel rails, less than 3 ft.	9.25 to 9.75	
Steel rails, less than 2 ft.	10.00 to 10.50	
Angle bars, steel.	8.25 to 8.75	
Cast iron carwheels.	7.50 to 8.00	
Railroad malleable.	7.00 to 7.50	
Agricultural malleable.	7.00 to 7.50	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00	
*Relay. rails, 65 lb. and up	22.00 to 27.00	

Per Net Ton

Per Net Ton		
Iron angle and splice bars.	7.00 to 7.50	
Iron arch bars, transoms.	7.50 to 8.00	
Iron car axles.	13.50 to 14.50	
Steel car axles.	10.50 to 11.00	
No. 1 railroad wrought.	5.50 to 6.00	
No. 2 railroad wrought.	6.50 to 7.00	
No. 1 busheling.	5.00 to 5.50	
No. 2 busheling.	2.50 to 3.00	
Locomotive tires, smooth.	8.00 to 9.00	
Pipes and flues.	3.25 to 3.75	
No. 1 machinery cast.	7.50 to 8.00	
Clean automobile cast.	7.50 to 8.00	
No. 1 railroad cast.	6.00 to 6.50	
No. 1 agricultural cast.	6.50 to 7.00	
Stove plate.	6.25 to 6.75	
Grate bars.	5.75 to 6.25	
Brake shoes.	5.75 to 6.25	

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

► PHILADELPHIA ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$7.00 to \$8.00	
No. 2 heavy melting steel.	6.00 to 6.50	
No. 1 railroad wrought.	8.50 to 9.00	
Bundled sheets.	6.00	
Hydraulic compressed, new.	6.50 to 7.00	
Hydraulic compressed, old.	6.00 to 6.50	
Machine shop turnings.	4.00 to 4.50	
Heavy axle turnings.	6.00 to 6.50	
Cast borings (nom.).	3.50	
Heavy breakable cast.	9.00	
Stove plate (steel works).	7.00	
No. 1 low phos. hvy.	11.00 to 12.00	
Couplers and knuckles.	8.50 to 9.00	
Rolled steel wheels.	8.50 to 9.00	
No. 1 blast furnace.	3.50	
Spec. iron and steel pipe.	10.50	
Shafting.	13.50 to 14.00	
Steel axles.	14.50 to 15.00	
No. 1 forge fire.	6.75 to 7.25	
Cast iron carwheels.	10.00 to 10.50	
No. 1 cast.	10.00 to 10.50	
Cast borings (chem.).	11.50 to 12.00	
Steel rails for rolling.	10.50	

Old Material Quotations

► CLEVELAND ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$7.50 to \$8.00	
No. 2 heavy melting steel.	6.75 to 7.25	
Compressed sheet steel.	7.00 to 7.25	
Light bundled sheet stampings.	6.00 to 6.50	
Drop forge flashings.	6.00 to 6.25	
Machine shop turnings.	4.50 to 4.75	
Short shoveling turnings.	5.75 to 6.25	
No. 1 busheling.	6.50 to 6.75	
Steel axle turnings.	7.50 to 8.00	
Low phos. billet crops.	14.00 to 14.50	
Cast iron borings.	4.50 to 4.75	
Mixed borings and short turnings.	5.50 to 6.00	
No. 2 busheling.	5.00 to 5.50	
No. 1 cast.	9.00 to 9.50	
Railroad grate bars.	6.00 to 6.50	
Stove plate.	6.00 to 6.50	
Rails under 3 ft.	15.00 to 15.50	
Rails for rolling.	13.00 to 13.50	
Railroad malleable.	11.00 to 11.25	

► NEW YORK ◄

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel.	\$4.25 to \$5.50	
Heavy melting steel (yard).	3.00 to 3.25	
No. 1 hvy. breakable cast.	5.00 to 5.50	
Stove plate (steel works).	3.00 to 3.50	
Machine shop turnings.	1.00 to 1.50	
Short shoveling turnings.	1.00 to 1.50	
Cast borings.	1.00 to 1.50	
No. 1 blast furnace.	1.00 to 1.50	
Steel car axles.	10.00 to 10.50	
Iron car axles (nom.).	14.00 to 14.50	
Spec. iron and steel pipe.	5.00	
Forge fire.	3.25	
No. 1 railroad wrought.	5.00 to 5.25	
No. 1 yard wrought, long.	4.00 to 4.25	
Rails for rolling.	6.00 to 6.25	
Stove plate (foundry).	4.75 to 5.25	
Malleable cast (railroad).	6.00 to 6.50	
Cast borings (chemical).	8.00 to 8.50	

Per gross ton, delivered local foundries:

No. 1 machinery cast.	\$8.50
No. 1 hvy. cast (cupola size).	6.50
No. 2 cast.	5.50

► BUFFALO ◄

Per gross ton, f.o.b. Buffalo consumers' plants:		
No. 1 heavy melting steel.	\$8.00	
No. 2 heavy melting scrap.	6.50 to 7.50	
Scrap rails.	8.00 to 8.50	
New hydraulic comp. sheets.	6.50	
Old hydraulic comp. sheets.	5.50	
Drop forge flashings.	6.50	
No. 1 busheling.	6.50 to 7.00	
Hvy. steel axle turnings.	8.00 to 8.50	
Machine shop turnings.	4.50 to 5.00	
Knuckles and couplers.	10.00	
Coll and leaf springs.	10.00	
Rolled steel wheels.	10.00	
Low phos. billet crops.	12.50 to 13.00	
Short shov. steel turnings.	7.00 to 7.50	
Short mixed borings and turnings.	6.00 to 6.50	
Cast iron borings.	6.00 to 6.50	
No. 2 busheling.	4.50 to 5.00	
Steel car axles.	10.00 to 11.00	
Iron axles.	12.00 to 12.50	
No. 1 machinery cast.	9.50 to 10.00	
Stove plate.	8.25 to 8.75	
Steel rails, 3 ft. and under.	12.00 to 12.50	
Cast iron carwheels.	9.00 to 9.50	
Industrial malleable.	9.00 to 9.50	
Railroad malleable.	9.00 to 9.50	
Chemical borings.	9.00 to 9.50	

► BOSTON ◄

Dealers' buying prices per gross ton:		
Heavy melting steel.	\$4.00 to \$4.25	
Scrap T rails.	3.50 to 4.50	
Machine shop turnings.	1.05	
Cast iron borings.	1.05	
Bundled skeleton, long.	2.50	
Forge flashings.	3.00 to 3.50	
Blast furnace scrap.	1.05	
Forge scrap.	3.00 to 3.25	
Shafting.	9.50 to 10.00	
Steel car axles.	9.00 to 9.50	
Wrought pipe.	4.00 to 4.25	
Rails for rolling.	6.00 to 6.50	
Cast iron borings, chemical.	7.00 to 7.25	

Per gross ton delivered consumers' yards:

Textile cast.	\$8.75 to \$9.25
No. 1 machinery cast.	8.75 to 9.25
Stove plate.	5.00 to 5.25
Railroad malleable.	10.50 to 11.00

► CINCINNATI ◄

Dealers' buying prices per gross ton:		
Heavy melting steel.	\$6.00 to \$7.00	
Scrap rails for melting.	8.00 to 8.50	
Loose sheet clippings.	2.75 to 3.25	
Bundled sheets.	4.75 to 5.25	
Cast iron borings.	2.75 to 3.25	
Machine shop turnings.	3.25 to 3.75	
No. 1 busheling.	4.25 to 4.75	
No. 2 busheling.	2.50 to 3.00	
Rails for rolling.	9.00 to 9.50	
No. 1 locomotive tires.	8.50 to 9.00	
Short rails.	11.75 to 12.25	
Cast iron carwheels.	8.25 to 8.75	
No. 1 machinery cast.	10.00 to 10.50	
No. 1 railroad cast.	8.75 to 9.25	
Burnt cast.	4.25 to 4.75	
Stove plate.	4.25 to 4.75	
Agricultural malleable.	8.00 to 8.50	
Railroad malleable.	9.00 to 9.50	

► ST. LOUIS ◄

Dealers' buying prices per gross ton:		
Hvy. melting.	\$5.75 to \$6.25	
Borings and short turnings.	2.75 to 3.25	
Long turnings.	2.75 to 3.25	
No. 1 machinery cast.	8.50 to 9.00	
Automotive cast.	10.75 to 11.25	
Hydraulic comp. sheets.	5.75 to 6.25	
Stove plate.	4.50 to 5.00	
New No. 1 busheling.	4.7	

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.75c.
Rail steel reinforcement—	
For buildings	1.55c.
Road slabs, bridges, culverts	1.40c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, $\frac{1}{4}$ in. (In. Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes ($\frac{1}{4}$ in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.
Per Cent Off List	
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinfor. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.10c.
Cold-fin. flats and sq.	3.60c.
Hoops and bands, No. 12 to $\frac{1}{4}$ in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.25c.
Black ann'l'd wire, per 100 lb.	\$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinfor. bars	3.00c.
Rail steel reinfor. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in. 4-in.	\$17.50
Lap-welded steel boiler tubes, 2-in. 4-in.	36.00
4-in.	16.50
34.50	

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$2.45
Black wire, base per 100 lb.	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-rolled, strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger	3.40c.
Smooth finish, 1 to $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base per keg	\$2.60
Per Cent Off List	
Machine bolts, cut thread:	Off List
$\frac{1}{4}$ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
$\frac{1}{4}$ x 6 in. and smaller	65 to 65 and 10
$\frac{1}{4}$ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.00
Charcoal iron, 4-in.	67.00
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
Per Cent Off List	
Tank rivets, $\frac{1}{4}$ -in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63

PACIFIC COAST

	Base per Lb.
San Fran. Los Angeles Seattle	
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier	2.80c. 3.00c. 2.50c.
Soft steel bars	2.80c. 3.00c. 2.50c.
Reinforcing bars	2.80c. 2.80c. 3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c. 4.00c. 4.00c.
Hot-rolled sheets (No. 10)	3.40c. 3.50c. 3.50c.
Galv. sheets (No. 24)	4.40c. 4.20c. 4.50c.
Struct. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.	5.00c. 5.00c. 5.50c.
Cold-finished steel bars and shafting:	
Rounds	5.25c.
Square and hexagon	6.25c.
Flats	6.75c.
Common wire nails, base per keg in less carloads	\$2.75 \$2.75 \$2.75
Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials	
Cold-finished steel bars and shafting, subject to warehouse differentials for quantity	

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock:	
Rounds and hexagons	3.10c.
Flats and squares	3.90c.
Cold-rolled, strip, soft and quarter hard	4.95c.
Hoops	3.40c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat sizes	3.00c.
Track bolts, all sizes, per 100 count, 70 and 10 per cent off list	
Machine bolts, 100 count, 70 and 10 per cent off list	
Carriage bolts, 100 count, 70 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.25
Cement coated nails, per keg	2.25

*On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinfor. steel bars, sq., twisted and deform	2.80c.
Cold-fin. steel, rounds and hex	3.30c.
Cold-fin. steel, sq. and flats	3.80c.
Steel hoops	3.15c.
Steel bands, No. 12 to $\frac{1}{4}$ -in., incl.	2.90c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled and annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ in.	5.10c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars:	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel:	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Rivets, structural or boiler	4.80c.
Per Cent Off List	
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Exchange Difficulties Hinder Britain's Steel Export Sales

Continental Position, Except in Germany, Has Improved Slightly—
German Situation Is Acute

LONDON, England, Jan. 18. (By Cable.)—Exchange difficulties continue to hinder exports. Works are badly in need of orders. Tin plate inquiries are brisk from all parts of the world, and there have been further sales to North America. Prices are firm. There is optimism regarding the plan proposed for regulation of output. Shipments are large; Swansea stocks are the lowest in years.

The Continental position, aside from that of Germany, has improved slightly following better export sales and a firming of gold prices. There is a possibility of Belgium and Luxembourg joining France in an agreement to regulate output. The International Raw Steel Cartel renewal has been agreed upon broadly, but negotiations for the formation of a central sales organization for semi-finished steel and structural shapes appear to have been fruitless. Belgium is insisting on increased quotas. A further meeting is indefinite.

The German situation is acute. Based on present prospects, German steel output for 1932 is estimated at less than 5,000,000 tons.

The Italian Government has ordered the establishment of a national steel cartel to regulate output. Individual members are arranging quotas.

Swedish employers have declared a lockout of 91,000 iron engineering workers for Jan. 24.

The International Wire Syndicate has arranged for suspension of operations of the Dutch Helmond wire mills for five years, with compensation. Similar action is proposed for other Dutch, German, Danish and Rumanian plants.

Iron Roads Satisfactory in Great Britain

LONDON, ENGLAND, Jan. 9.—Success of small experimental sections of cast iron surfaced roadway in Islington and Nottingham has stimulated more extensive trials of this road surface in other parts of the country. According to the borough engineer of Islington, the motor traffic over this section is especially heavy, but the iron road has given complete satisfaction. While this section has been in use only about two months, the Nottingham experiment has been carried out for more

than a year. In the iron roadway, the surface consists of triangular castings laid on a foundation of cement, which is thinly coated with bitumen.

British Output of Iron and Steel in 1931

LONDON, ENGLAND, Jan. 14 (By Cable).—December production of pig iron was 330,600 gross tons and that of steel 422,400 tons. The 1931 total was 3,758,100 tons of pig iron and 5,175,600 tons of steel. Comparisons of last year with other years are as follows in gross tons per month:

	Pig Iron	Steel
1913	855,000	638,600
1928	550,800	710,000
1929	632,400	804,600
1930	516,400	608,200
1931	313,180	431,300

Austrian Steel Industry May Be Shut Down

HAMBURG, Jan. 4.—The entire Austrian steel industry may be shut down soon. An effort has been made to induce the railroads to order rails in advance in order that the shutdown could be avoided, but this plan apparently failed owing to the difficult financial situation of the railroads. The demand in Austria for steel is

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton		
Ferromanganese, export £9 0s.		
Billets, open-hearth....	5 7 1/2	to £5 12 1/2s.
Black sheets, Japanese specifications	9 7 1/2	to 9 10
Tin plate, per base box	0 14	3d to 0 14 9d
Steel bars, open-hearth.	7 17 1/2	to 8 7 1/2
Beams, open-hearth....	7 7 1/2	to 7 17 1/2
Channels, open-hearth....	7 12 1/2	to 8 2 1/2
Angles, open-hearth....	7 7 1/2	to 7 17 1/2
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 5	

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86		
Billets, Thomas.....	£2 9s.	
Wire rods, No. 6 B.W.G.	5 5	
Black sheets, No. 31 gage, Japanese.....	11 5	
Steel bars, merchant..	2 15	
Beams, Thomas.....	2 15	
Angles, Thomas, 4-in. and larger.....	2 14	
Hoops and strip steel over 6-in. base.....	3 17	
Wire, plain, No. 8.....	5 7 1/2	
Wire, barbed, 4-pt., No. 10, B.W.G.....	8 15	

now only about 10 per cent of what it was two years ago, and export business is impossible. The Austrian steel works are the oldest in Europe. The Erzberg iron mountain, consisting almost entirely of high-grade ores, has been the basis for iron production since the first century.

German Steel Sales to United States Continue

HAMBURG, Jan. 4.—The better demand for steel from the United States continues. Orders this week consist chiefly of open-hearth thin angles with sharp corners, cotton ties, and channels of American standard section. The price for the latter product was \$28.50 a ton, c.i.f. San Francisco. Angles were sold at \$29.50, c.i.f. American port.

More Durable Lining for Steel Furnaces

The development of an improved lining for steel furnaces, which gives promise of a much longer life, has been announced by the Bureau of Standards.

Iron oxide or basic slags high in iron oxide are quite generally used for bonding magnesite linings of basic steel-melting furnaces. The practice is open to serious objection in that the liquid steel of the furnace bath may dissolve this iron oxide bond out of the lining. This destruction of the bond injures the lining and may result in pieces of the lining breaking loose and rising through the steel bath, with consequent deterioration of the quality of the steel from solution of oxygen. This is particularly unfortunate if it occurs when the steel is practically finished and ready to tap.

The desirability of making magnesite linings without the use of iron oxide or slag was one of the aims in the development of experimental basic linings for electric arc steel-melting furnaces.

A lining of electrically sintered magnesia bonded with 20 per cent water-ground magnesia was installed in a rocking electric furnace of the indirect arc type at the Bureau of Standards. Under rather severe service tests, melting a variety of ferrous alloys from gray iron to high-speed tool steels, this lining had a very satisfactory life.

Unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingots Metal Institute, as of Jan. 1, amounted to a total of 21,067 tons.

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Index for December Rises

MACHINE tool buying in December, as reported by the National Machine Tool Builders' Association, gained for the first time since August. The December index figure was 67.6 (100 representing the average shipments of 1922, 1923 and 1924), compared with 50.4 for November and 44.5 for October. The highest figure for 1931 was 117.6 in March, following which there was a steady decline to August, and then a further decline during the remaining months until December.

Although the Machine Tool Builders' Association does not comment on the reasons for the year-end increase, it is said that it was largely due to automobile business and some Russian orders which came by way of Germany. The increase last August was due principally to Russian orders.

The three months' moving average of machine tool orders rose to 54.3 at the end of December from 50.4 at the end of the preceding month. Unfilled orders as of Dec. 31 are represented by 104.1 against 97.3 for November

Automobile Buying and Some Russian Business Largely Accounted for the Increase

and 96.5 for October. The year-end unfilled orders were 1.82 times shipments of December.

Not much improvement in business has occurred thus far in January, but in some industrial centers there is a decidedly more hopeful feeling. Two or three large buyers in the East have plans for manufacturing changes that may result in fairly large machine tool purchases. Prospects for improved machine tool buying are dependent to a large extent on a better trend of general business.

New York

Although machine tool buying has increased very little during the first half of January, there is a decided improvement in prospects. Two or three of the largest machine tool buyers in the East have tentative plans for manufacturing changes that will involve the purchase of new equipment. Definite inquiries have not been issued, but may appear soon. Two lists aggregating 40 to 50 tools which have been quoted on by New York dealers in the past few weeks are still pending.

Milwaukee

The machine tool industry is gradually being lifted out of the depths, although progress toward substantial improvement is still meeting strong resistance from the relative inactivity of general business. Tool builders and the automotive industries are watching intently the effect of the automobile shows as a guide to the formulation of production programs. Meantime, new business remains restricted to the most urgent needs.

Cleveland

Machine tool business is still at low ebb. With few sales and little inquiry the market shows virtually no change from that in December. Dealers are confining activity largely to developing prospects for replacement

equipment that will result in reduction of manufacturing costs. While not much progress is being made in this direction at present, plant managers are expected to show more interest in improved types of tools as soon as business becomes better.

Chicago

The drift of this market is somewhat less erratic as interest in miscellaneous tools slowly continues to gather momentum. Sales remain light. Nothing of moment has developed at nearby automobile plants, the impression being that plans are being held in check while results of the shows are measured. In many instances not even moderate demands for small tools can be supplied in full from the shelves of local dealers.

Pittsburgh

Better sentiment prevails in the local machinery market, although orders and new inquiries show little change. A number of buyers are promising tool purchases in the early spring, but most of them admit that the trend of general business will govern their actions in the final reckoning. Replacement of obsolete equipment offers the best possibilities for improved buying, but only a few companies are in a financial position to make large expenditures in this way just now.

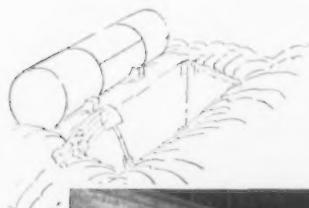
The Westinghouse Electric & Mfg. Co., East Pittsburgh, is doing practically no buying and has issued no definite list for the first six months of the year. A large number of tools will probably be needed by the Pennsylvania Railroad to replace equipment in its Twelfth Street shops at Altoona, Pa., recently destroyed by fire. However, no definite plans for rebuilding the shops have yet been formulated.

Cincinnati

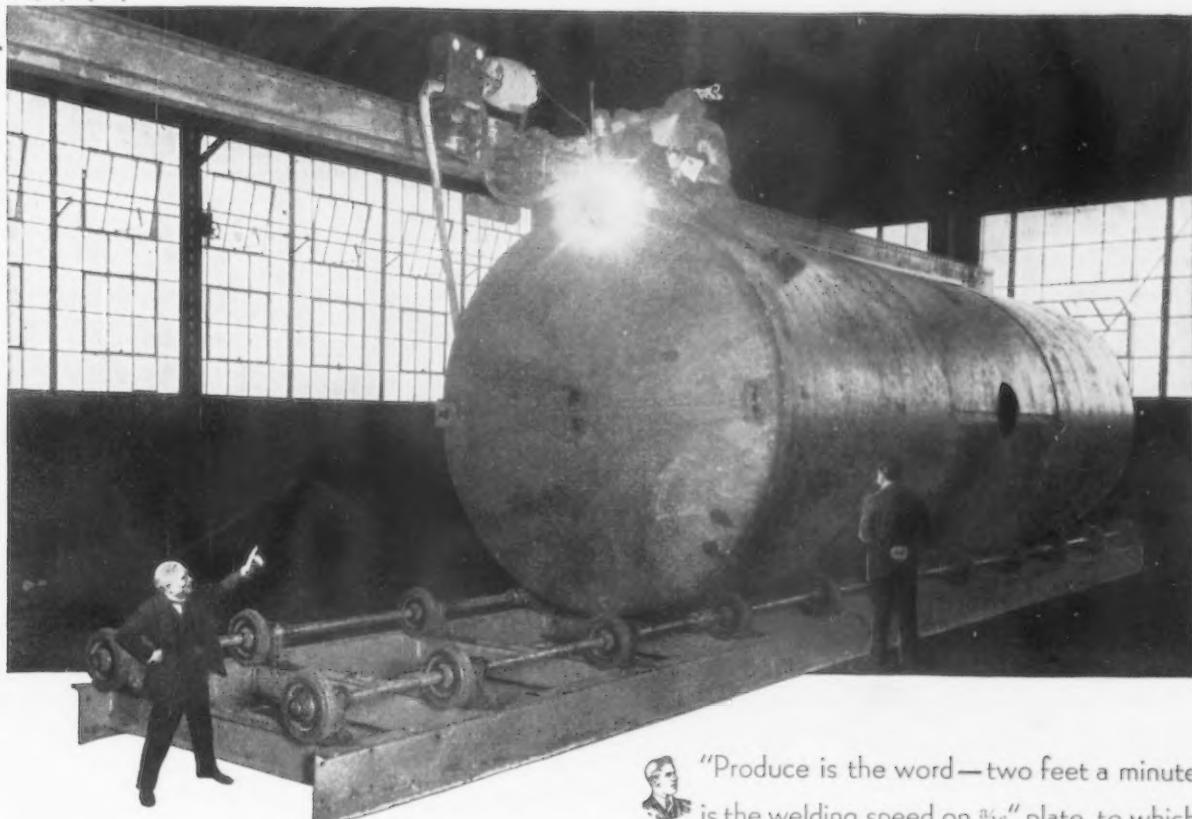
Although sentiment in this district is improved, there is nothing of a tangible nature on which to base present optimism. Fresh bookings of machine tools were less than those during the preceding week. Current inquiries, which are still in good number, appear to be more encouraging and manufacturers anticipate greater returns on quotations than heretofore.

New England

The city of Holyoke, Mass., has completed the purchase of about \$17,000 worth of new and used equipment for a school shop, and the Boston Navy Yard has placed two screw machines. Business otherwise was confined to a few low-priced new tools and some used equipment. One local house has built up a substantial business in drill heads, bookings of which were quite encouraging.



POP AND LAD STUDY TANK WELDING . .



 "One of the largest tank shops in the country asked us to drop in to see this big Lincoln automatic arc welder in action.

"They tell me it welds tanks from 2 ft. to 12 ft. in diameter—up to 40 ft. in length. It's arranged for longitudinal, girth and head seams—and no filler material is needed since the plates themselves are fused together.

"This looks like an answer to our tank shop needs if it can produce. You have figures on that, haven't you?"

 "Produce is the word—two feet a minute is the welding speed on $\frac{3}{16}$ " plate, to which I should add AND HOW—that HOW being the Shielded Arc process produced by the Electronic Tornado head you're examining.

"8 out of 10 of the largest tank shops in the country use this process . . . making range boilers . . . oil dispensing tanks . . . storage tanks and other containers . . . with same results as to quality and speed.

"You know it's no trick at all to make a tank tight with almost any arc welder—but today it's SPEED that counts. Lack of it discounts."

LINCOLN

THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

Largest Manufacturers of Arc Welding Equipment in the World

◀ NEW YORK ▶

Sylvania Industrial Corpn., 122 East Forty-second Street, New York, manufacturer of transparent cellulose paper products, let general contract to Doyle & Russell, Richmond, Va., for one-story addition to mill at Fredericksburg, Va. Cost over \$75,000 with equipment. Dr. Frank H. Reichel, vice-president, is in charge.

Astoria Light, Heat & Power Co., Astoria, L. I., has approved plans for extensions and improvements in generating station. Cost over \$50,000 with equipment.

Royal Aluminum Corpn., Long Island City, has been organized by Irving J. Henry, 81 Chelsea Road, and Albert H. Alderton, 29 Brompton Road, both Garden City, L. I., with capital of \$100,000 to manufacture aluminum domestic appliances.

General Printing Ink Corpn., 100 Sixth Avenue, New York, operating American Printing Ink Co., Chicago, and other interests, plans branch plant at Toronto. Canadian subsidiary will be formed to carry out project, headed by Perry D. Richards, secretary of parent organization.

Superintendent of Lighthouses, Staten Island, N. Y., asks bids until Jan. 25 for 100 flashing mechanisms for controlling light and eclipse periods of flashing acetylene beacons and buoys.

Board of Education, 60 South Third Avenue, Mount Vernon, N. Y., plans installation of manual training equipment in three-story addition to Washington Junior High School. General contract to Cuzzi Brothers, 10 South Second Avenue. Cost about \$750,000. H. Werner and William Van Alen, Chrysler Building, New York, architects.

Gottfried Baking Co., Inc., Eleventh Avenue and Fifty-first Street, New York, plans installation of ovens, conveying and other mechanical equipment in one-story addition, 75 x 100 ft. Cost over \$65,000 complete.

Cardinal Machine Co., Inc., New York, has been organized by Salvatore Cardinali, Meucci Avenue, Copiague, L. I., and Nathan Metter, 145 Franklin Avenue, Brooklyn, to manufacture machinery and tools.

Bureau of Supplies and Accounts, Navy Department, Washington, and Naval Supply Depot, Brooklyn, asks bids until Jan. 26 for 625 oil-burning hand lanterns (Schedule 7256); until Feb. 2 for 384 storage battery testing outlets (Schedule 7265) for Brooklyn Navy Yard.

Interborough Rapid Transit Co., 165 Broadway, New York, contemplates installation of signal equipment and train tripping devices on Second Avenue elevated line from Chatham Square to 129th Street. Cost over \$325,000.

Parr Electric Co., Inc., 28 Treat Place, Newark, N. J., industrial electrical equipment and supplies, has purchased one-story and basement factory at 40-44 Austin Street for new plant.

Board of Education, Pompton Lakes, N. J., contemplates manual training department in two and one-half story junior and senior high school. Bids asked on general contract. Cost about \$400,000. Hacker & Hacker, 201 Main Street, Fort Lee, N. J., architects.

Public Service Corporation, Terminal Building, Newark, operating Public Service Electric & Gas Co. and other utilities, has authorized fund of about \$12,500,000 for expansion and improvements in power plants, transmission lines and gas properties.

American Conduit Co., Newark, care of DeGraw, Murray & Keenan, 1172 Raymond Boulevard, attorneys, has been organized by Emil J. Sadloch and associates to manufacture metal conduits and kindred products.

Bornstein & Sons, 1524 Maple Avenue, Hillside, Newark, bakers, asked bids on general contract for one- and two-story service, storage and distributing plant, with repair and garage facilities for company automobiles. Cost over \$100,000 with equipment. Joseph Cannetti, 142 Market Street, architect.

Superior Air Products Co., 132 Malvern Avenue, Newark, manufacturer of industrial oxygen, etc., purchased one- and two-story plant, 56 x 100 ft., address noted, heretofore occupied under lease, and contemplates one-story addition in spring.

Wright Aeronautical Corpn., Paterson, N. J., has secured contract from War Department for 134 Curtiss type engines and spare parts, totaling \$1,110,210, and will increase production schedule.

◀ NEW ENGLAND ▶

Holyoke Water Power Co., Canal Street, Holyoke, Mass., is planning addition to power plant on Connecticut River, including extension of power dam. Cost over \$80,000.

Blackall, Clapp, Whittemore & Clark, 31 West Street, Boston, architects, have plans for remodeling portion of South Station for automobile service, repair and garage building. Cost over \$125,000 with equipment.

National Stamping Co., Boston, has been organized by Irving Freid and John W. Barenberg, Cambridge, Mass., to manufacture metal stampings.

Kalman Steel Corpn., 75 Federal Street, Boston, manufacturer of steel reinforcing bars, wire shapes, etc., subsidiary of Bethlehem Steel Corp., has filed plans for two-story storage and distributing plant at Charlestown, Mass. Cost over \$35,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 2 for one forging hammer to operate either by air or steam, for Boston Navy Yard. (Schedule 7275).

Palmer Steel Co., Inc., Main Street, Springfield, Mass., fabricated steel products, has plans for two one-story units at Wilmansett, Mass., one structure to be used for storage and distribution. Cost over \$50,000 with equipment.

General Electric Co., Schenectady, N. Y., plans removal of plant of subsidiary, Edison General Electric Appliance Co., Chicago, manufacturer of electric heating equipment and appliances, to Bridgeport, Conn., where production for Eastern part of country will be concentrated.

Construction Service, Veterans' Administration, Washington, asks bids until Feb. 9 for coal bunker and stoker equipment for power house at Veterans' Hospital, Bedford, Mass.

Board of Education, Newport, R. I., contemplates manual training department in new junior high school. Cost over \$200,000. D. S. Shapiro, Globe Building, Fall River, Mass., architect.

Oil Burner Products Co., Inc., Worcester, Mass., has been organized by George O. Brumm, 9 May Street, and associates to manufacture oil burners and oil burning devices.

Berger Brothers, New Haven, Conn., has plans for an addition, for which miscellaneous equipment will be purchased.

United States Navy will hold sale of surveyed material, including scrap iron and steel and used machinery, at Naval Torpedo Station, Newport, R. I., Feb. 2.

Turner & Seymour Mfg. Co., Torrington, Conn., has bought good will, stock and equipment of Smith & Egge Mfg. Co., Bridgeport, Conn., maker of small chain, and will move Bridgeport equipment to Torrington.

◀ PHILADELPHIA ▶

Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Jan. 25 for quantity of cast iron bevel washers (Req. 5015-1288), quantity of rubber insulated cable (Req. 5015-1287), and for chrome vanadium alloy steel screwdrivers (Aero Req. 435-32).

Bell Telephone Co. of Pennsylvania, 1835 Arch Street, Philadelphia, has plans for three-story and basement exchange station at Franklin Avenue and St. Vincent Street. Cost about \$150,000 with equipment. John T. Windrim, Commonwealth Building, architect.

Philadelphia & Reading Coal & Iron Co., Reading Terminal Building, Philadelphia, plans rebuilding experimental coal briquette plant at Landingville, Pa., recently destroyed by fire.

Lehman Sprayshield Co., Philadelphia, has been organized by Louis H. Lehman and Howard E. Stern, with capital of \$50,000 to take over and expand company of same name at 2514 North Broad Street, manufacturer of plumbing supplies, metal enclosures, etc.

Sheffield Mfg. Co., Philadelphia, has leased space in building at Amber and Willard Streets, for manufacture of lamp shade specialties.

Midland Tube Co., Bordentown, N. J., recently organized, has taken over local plant of Bordentown Steel & Tube Co., closed for several months, and will improve for early production.

Fitz-Gibbon & Crisp, Inc., Calhoun and Dunham Streets, Trenton, N. J., manufacturer of automobile bodies, let general contract to Fred R. Parker, 327 Calhoun Street, for one-story addition, 70 x 130 ft. Louis S. Kaplan, 33 West State Street, architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 2 for one pitot and bellow apparatus, five speed indicators and distance recorders and spare parts, etc. (Schedule 7276) and one motor-driven blueprinting machine (Schedule 7283); until Feb. 9 for 72 bomb racks (Schedule 7277), all for Philadelphia navy yard; until Jan. 26 for one tube bender (Schedule 7259); until Feb. 2 for four to six sets masthead mooring equipment for airships (Schedule 7262) for naval air station, Lakehurst, N. J.

Fulton Watch Co., Lancaster, Pa., has been organized by P. W. and J. Urban Baker, Landisville, Pa., and associates, with capital of \$100,000, to manufacture watch mechanisms, including parts and assembling.

Pennsylvania Railroad Co., 15 North Thirty-second Street, Philadelphia, C. E. Walsh, purchasing agent, asks bids until Jan. 26 for quantity of steel boiler tubes (Contract 3-1932).

Stouffer Tractor & Equipment Co., Harrisburg, Pa., has been organized by Robert A. and Edwin L. Stouffer, 151 North Twenty-fifth Street, to manufacture tractors, road machinery, construction equipment, etc.

Pennsylvania Railroad Co., Enola, Pa., has recalled about 230 men at local steel car repair shops, following curtailment of about two months.

◀ SOUTH ATLANTIC ▶

Oriole Machine Corp., Baltimore, recently organized, has leased three-story building at 8 East Mount Royal Avenue, totaling 5000 sq. ft. space, for new plant for manufacture of metal and mechanical specialties.

Purchasing and Contracting Officer, Quartermaster Depot, Holabird, Baltimore, asks bids until Jan. 25 for brake equipment, steel wheels, switch assembly, compressor bracket, hand brake brackets and other truck parts (Circular 76); until Jan. 27 for parts for conversion of trucks, including 700 steel equipments, 700 steel disk wheels, 560 hubs, 140 socket wrenches, 140 socket wrench handles, rim bolts, rim bolt nuts, rim clamps, bushings and other parts (Circular 78).

Baltimore Wholesale Grocery Co., 811-17 Granby Street, Baltimore, let general contract to Lacchi Construction Co., Munsey Building, for four-story storage and distributing plant addition, 95 x 95 ft., and for two additional stories on present storage and distributing unit. Cost over \$100,000 with equipment. J. Herbert Stehl, 3929 Ridgewood Avenue, architect.

Swift & Co., Union Stock Yards, Chicago, plan installation of refrigerating and ice plant equipment in new branch plant units at Greensboro and Durham, N. C. Each to cost over \$45,000 with equipment.

Purchase Section, Bureau of Standards, Washington, asks bids until Jan. 29 for furnishing and installing CO_2 distribution system and for steel cover plates for hydraulic laboratory.

Division of Purchases and Sales, Department of Commerce, Washington, asks bids until Feb. 11 for depth measuring and recording apparatus (Proposal 24041).

Hendler Creamery Co., 1100 East Baltimore Street, Baltimore, plans installation of number of stainless steel tanks in connection with expansion and improvements. Cost about \$100,000 with equipment.

Weaver & Tanner Co., Brightwood, Va., is considering rebuilding three-story chair manufacturing plant recently destroyed by fire. Loss over \$30,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 26 for two motor-driven tool room lathes (Schedule 7253) and one motor-driven power press brake machine (Schedule 7264) for Hampton Roads, Va., navy yard; for two motor-driven gang punch and press brakes (Schedule 7261) for Norfolk, Va., yard; until Feb. 2 for quantity of steel tubing for Brooklyn, Philadelphia and Mare Island navy yards (Schedule 7259); quantity of corrosion resisting bar steel for Portsmouth, N. H., and Mare Island, Cal., yards (Schedule 7273).

Porter Placer Mining Co., Bridgewater, N. C., Frank R. Porter, Isotherman Hotel, Rutherfordton, N. C., president, plans establishment of mining plant at Portermill, Rutherford County, N. C., where properties have been acquired. Will install cyanide plant for handling gold ores, as well as crushing, conveying and other equipment; also, electromagnetic separating machinery for monazite sands, and reduction equipment for chemical treatment. Cost over \$50,000.

Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has acquired 32 lots in Twin River Beach district, Chase, Md., as site for power substation for electrification program. Cost over \$85,000 with equipment.

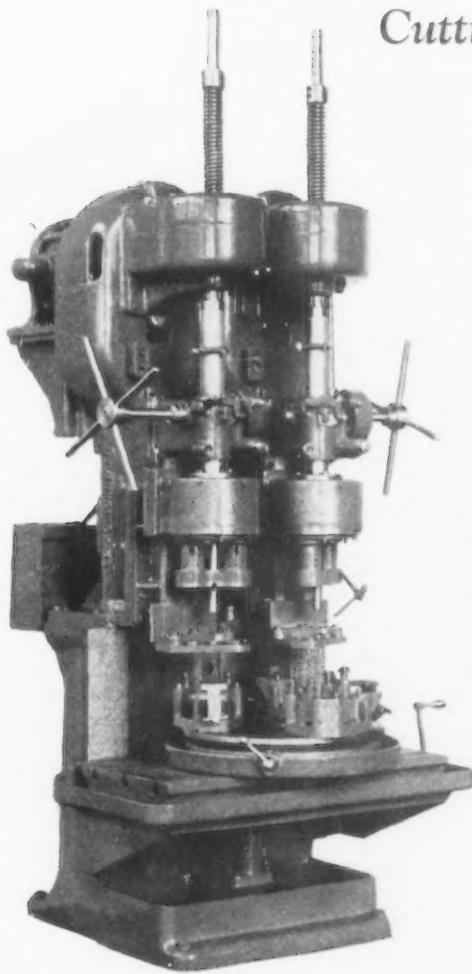
General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 3 for pipe fittings, pipe hangers, brass tubing, wire rope,



TOOLS THAT FAN THE AIR

CAN'T REDUCE DRILLING COSTS!

**DIRECT-DRIVE Uprights Keep All the Tools
Cutting Practically All the Time**



DIRECT-DRIVE Upright Drilling Machines may be equipped with an indexing table and drill head, and when so equipped practically all of the time is actual cutting time. It is obvious that drills turning idly in the air are not tending to reduce drilling costs.

This is a matter which is going to be very much in the foreground during 1932, and anything that contributes to a shortening of the time between actual cuts is most certainly a move in the right direction.

You'll save time and reduce maintenance cost to the minimum by drilling production jobs on the DIRECT-DRIVE. Let us give you the whole story in the DIRECT-DRIVE catalog. We await your request.



The DIRECT- DRIVE Upright

THE CINCINNATI BICKFORD TOOL CO.
Oakley, Cincinnati, Ohio



electric hammers, electric motors, starting switches, chain hoists, boiler tubes, track spikes, metal valves and other electrical and mechanical equipment (Schedule 2720).

◀ PITTSBURGH ▶

Haller Baking Co., 204 Dennison Avenue, Pittsburgh, has plans for two- and three-story storage and distributing plant, 76 x 100 ft., at Emsworth, Pa. Cost over \$65,000 with equipment. Paul R. Scheuneman, Magee Building, architect.

Harrison Construction Co., 2101 Sidney Street, Southside, Pittsburgh, has acquired property on Western Avenue for new headquarters, equipment storage and distributing plant. Work on buildings will soon begin. Cost over \$50,000.

Board of Public Education, Administration Building, Pittsburgh, plans manual training department in new Arsenal high school, now in course of erection. Cost about \$1,000,000.

West Branch Carbon Co., Sinnamahoning, Pa., has been organized by Oscar D. Bailey and James D. Counsil, Sinnamahoning, to manufacture carbon products for electrical service, metallic brushes, electric shunt connections, etc.

United States Engineer Office, Pittsburgh, asks bids (no closing date stated) for building one 2½-yd. steel hull dipper dredge; until Feb. 10 for one 40-ft. steel launch complete.

American Window Glass Co., Jeannette, Pa., will carry out reconditioning and improvement program in tank department and other divisions of sheet glass plant, idle for more than two years.

Applegate Machine Co., Huntington, W. Va., has been organized by Clark Applegate, 908 Third Avenue, and associates to manufacture machinery and parts.

Odin Stove Mfg. Co., Erie, Pa., is resuming full time production schedules with full work-

ing force, following curtailment for several months. Orders have been secured for more than 5000 stoves, insuring capacity well into spring.

United States Engineer Office, Huntington, W. Va., asks bids (no closing date stated) for one 15-ton steel hull whirler derrick boat; until Jan. 25 for 16,480 ft. wire rope (Circular 139), steel forgings, cast steel parts, cast iron parts, bushings, journal pins, etc., for parts for spare lock gate leaves (Circular 142).

Erie Enameling Co., Erie, Pa., has resumed operations in all departments on full time production and employment schedules.

Lind Co., Pittsburgh, has been organized to deal in fireproof building materials, including concrete reinforcing steel and aluminum double-hung windows and casements, factory sash, roof deck steel grating and kindred products. Offices, warehouse and fabricating shop will be in former headquarters of Carlem Engineering Co., 6949 Lynn Way, Pittsburgh, and personnel of Carlem company will be retained. Louis J. Lind is president of new company, and Norman K. Long manager of sales.

◀ DETROIT ▶

Detroit Edison Co., 2000 Second Avenue, Detroit, has authorized fund of about \$8,000,000 for construction and improvements. Program will include expansion at Delray power station No. 3, extensions in other power plants, power substations, transmission and distributing lines. About \$100,000 will be used for work at Port Huron, Mich., and vicinity.

Peninsula Metal Products Corp., 6635 East Forest Street, Detroit, plans rebuilding part of plant destroyed by fire Jan. 13. Loss over \$65,000 with equipment.

City Council, Ann Arbor, Mich., plans installation of pumping machinery and other power equipment in connection with new

sewage disposal plant. Cost \$750,000 with machinery. George Sandenburg, city engineer.

Standard Stanchion Mfg. Co., Detroit, has been organized by Albert Langer and Joseph Menzer, with capital of \$50,000, to take over and expand company of same name at 8053 Military Avenue, manufacturer of steel stanchions, boiler tubes, piping, etc.

United States Engineer Office, Detroit, asks bids (no closing date stated) for two-story equipment warehouse, with two one-story units adjoining, one to be used for oil service.

Baldwin Rubber Co., Pontiac, Mich., manufacturer of molded rubber goods, rubber floor mats for automobile running boards, etc., has begun expansion at mill, including installation of battery of eight mechanical presses and auxiliary equipment. Capacity will be increased. Plant is now running on two-shift day basis.

Kelvinator Corp., 14250 Plymouth Street, Detroit, manufacturer of electric refrigerating units, parts, etc., is arranging for manufacture of electric ranges at branch plant at London, Ont., operated in name of Kelvinator of Canada, Ltd.

American Enameled Products Co., Mount Pleasant, Mich., is considering additions to its line of metal specialties. Company has removed main offices from Chicago to Mount Pleasant.

Miller Metal Products Co., Detroit, has been organized by Anthom and Henry J. Miller, 6518 Jonathan Avenue, to manufacture iron, steel and other metal products.

Lincoln Motor Co., 6200 West Warren Street, Detroit, is giving employment to 3600 men, largest working force since 1928. Plant will run on full five-day week schedule for indefinite period.

Ford Motor Co., Dearborn, Mich., has plans by Albert Kahn, Inc., Marquette Building, architect and engineer, for one-story storage, distributing and service plant, 200 x 400 ft., on tract recently acquired on Potomac River, Alexandria, Va., to include enameling division and other departments. Cost over \$100,000 with machinery.

AC Spark Plug Co., Flint, Mich., is increasing production schedule at spark plug works, giving employment to about 35 per cent more operatives than at this time a year ago. Company is running full at die-cast plant, with three shifts every 24 hr. Production and employment at latter works are greatly in excess of this time last year.

◀ ST. LOUIS ▶

Board of Public Service, City Hall, St. Louis, asks bids until Feb. 2 for one- and two-story terminal building at Lambert St. Louis municipal airport, 66 x 200 ft. Cost \$152,000 with equipment. Albert Osburg and L. R. Bowen, architect and chief engineer, respectively, Department of Buildings and Bridges.

Kansas City Power & Light Co., Fourteenth Street and Baltimore Avenue, Kansas City, Mo., plans one-story power substation at Forty-third Street and Myrtle Avenue. Cost \$50,000 with equipment. Company will soon begin superstructure for similar station at 3410 Nicholson Avenue, 70 x 180 ft., to cost over \$55,000 with equipment.

Department of Public Service, Lincoln, Neb., asks bids until Feb. 10 for two steam turbine pumping units for waterworks station, one with daily capacity of 11,500,000 gal. and one with daily capacity of 5,000,000 gal. D. L. Erickson, city engineer.

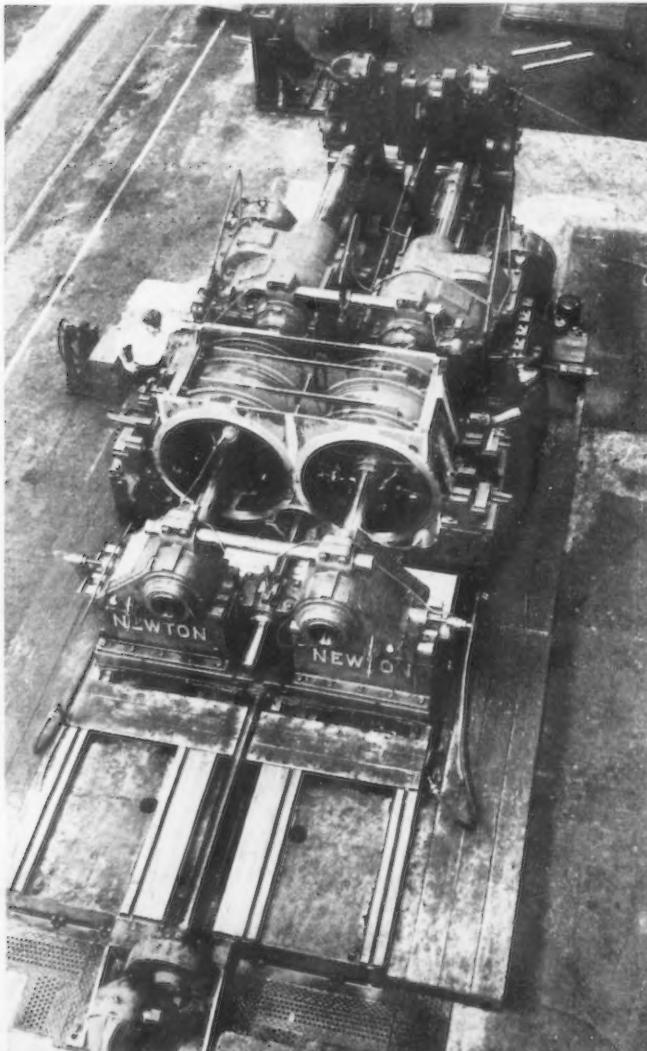
State Board of Control, Capitol Building, Lincoln, Neb., will soon ask bids for one-story and basement shop, 50 x 120 ft., at boys' reformatory, Lincoln, for automobile license plate manufacture. O. R. Shatto, secretary.

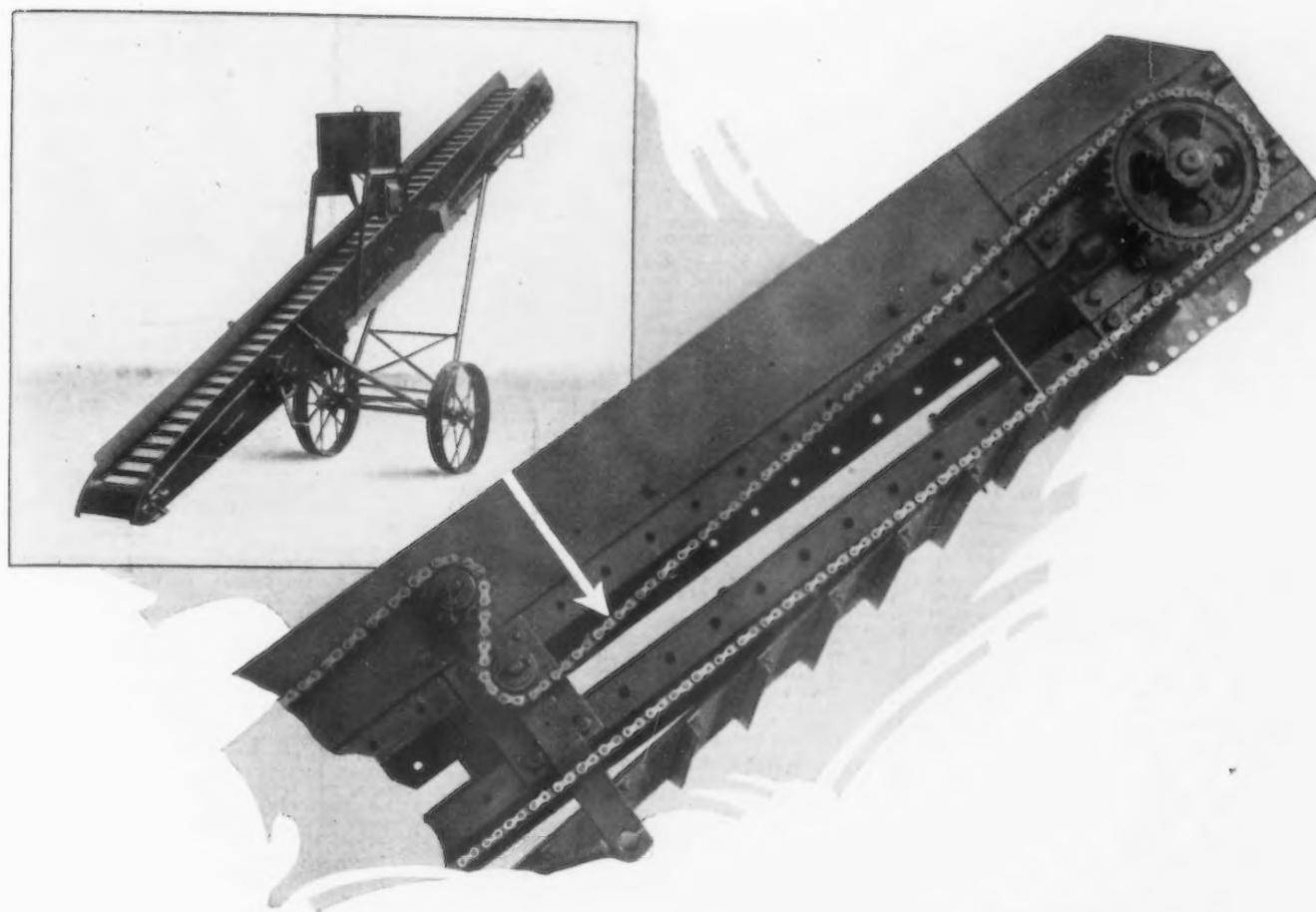
Crocker-Wallace Packing Co., Sedalia, Mo., meat packer, has plans for plant in northwestern part of city, in conjunction with new stockyards. Cost over \$50,000 with equipment.

Coca-Cola Bottling Co., Chickasha, Okla., has asked bids on general contract for one-story plant, 25 x 140 ft. Cost about \$40,000 with automatic bottling, conveying and other equipment.

Board of Education, Library Building, Kansas City, Mo., plans manual training department in new three-story and basement Lincoln High School. Cost about \$600,000. Charles A. Smith and Nate W. Downes, both Finance Building, are architect and mechanical engineers, respectively.

City Council, Kimball, Neb., plans installation of pumping machinery, tanks, engine and





WHITNEY Roller Chain is used on the Ace Conveyors manufactured by the A. B. Farquhar Company of York, Pa., which are widely used for handling coal, ashes, cinders, sand and other similar materials. Thousands of these sturdy labor-saving machines, operating for many years under a wide variety of rough-and-ready conditions, have established remarkable records of efficient, trouble-free operation.

In keeping with its general excellence of construction, WHITNEY Roller Chain is used for transmitting power from the prime mover (either a gasoline engine or an electric motor) to the head pulley of the "Iron-

clad" conveying belt. This drive has proved ideal for the service required; being not only positive and durable, but also sufficiently flexible to provide for slight misalignments and variable load strains.

WHITNEY Chains are available in many types and sizes—to meet practically any mechanical power transmission requirement, and WHITNEY Engineers will be glad to advise regarding the right selection for your particular purpose. Correspondence is cordially invited—no charge or obligation for engineering service.

THE WHITNEY MFG. CO., Hartford, Conn.

ATLANTA, GA.
Cox Foundry & Machine Co.,
985 Cox Avenue, S. W.

BOSTON
The Whitney Mfg. Co.,
250 Stuart St.

BUFFALO
Potter & Dugan, Inc.,
Agents
Court & Wilkeson Sts.
Bickford & Francis
Belting Co.,
Distributors—Pearl St.

CHICAGO
The Whitney Mfg. Co.,
549 W. Washington Blvd.

CINCINNATI
Smith Power Transmission Co.—H. M. Wood
622 Broadway

CLEVELAND
The Whitney Mfg. Co.,
1213 W. Third Street
Smith Power Transmission Co.,
Penton Bldg.

Sales and Engineering Offices:

DALLAS
O. H. Holman Co.,
111 No. Race St.

DENVER, COLO.
Colorado Gear Mfg. Co.,
1361-71 S. Broadway

DETROIT
The Whitney Mfg. Co.,
2-210 General Motors Bldg.

GASTONIA, N. C.
Precision Gear & Mch. Co.,
701 E. Franklin St.

LOS ANGELES
A. H. Coates Co.,
2011 Santa Fe Avenue

NEW YORK
L. C. Biglow & Co., Inc.,
250 W. 34th St.

PHILADELPHIA
The Whitney Mfg. Co.,
133 So. 36th St.
Phila. Gear Works
Erie Avenue & G Street

PITTSBURGH
Pittsburgh Gear & Machine Co.,
27th & Smallman Sts.

PORLAND, ORE.
Portland Iron Works
495 Northrup St.

SAN FRANCISCO
A. H. Coates Co.,
615 Howard Street

SEATTLE
Herr-Evans Chain Co.,
1729 First Avenue, So.

SYRACUSE
George McPherson
291 Norwood Ave.

WHITNEY SILENT AND ROLLER CHAIN DRIVES
FOR POSITIVE POWER TRANSMISSION

other equipment in connection with sewage disposal plant. Cost over \$65,000.

Union Pacific Railroad Co., Omaha, Neb., has resumed operations at local repair shops on four-day week basis, giving employment to over 1000 men, following several months' curtailment.

City Council, University City, Mo., has approved a \$500,000 bond issue for purchase of a municipal lighting system, to be voted on at a special election Jan. 26.

Kinloch Brass Castings Co., St. Louis, is contemplating erection of a one-story foundry 59 x 70 ft. Cost about \$7,500. Construction will be begun as soon as funds are available.

◀ BUFFALO ▶

International Business Machines Corp., Endicott, N. Y., manufacturer of calculating and recording machines and parts, etc., plans new engineering laboratory. Cost over \$100,000 with equipment. Executive offices at 270 Broadway, New York.

Crescent Tool Co., Jamestown, N. Y., manufacturer of electricians' tools, wrenches, pliers, etc., plans one-story addition. Cost about \$25,000 with equipment.

Bower-Rochester Corp., Rochester, N. Y., has been organized by John A. Bower, 361 Lyell Avenue, Rochester, and Joseph M. Schantz, 3287 St. Paul Boulevard, Irondequoit, N. Y., to manufacture steel springs and kindred products.

Buffalo General Electric Co., Electric Building, Buffalo, is arranging budget of \$3,058,000 for expansion and improvements, including completion of Huntley electric generating station, new transmission lines and other construction.

Savory, Inc., 90 Alabama Street, Buffalo, manufacturer of sheet metal products, tinware, etc., has resumed operations at plant of subsidiary, Central Stamping Co., 591 Ferry Street, Newark, N. J., acquired a few months ago when operations were discontinued. It will be maintained as a branch plant.

Buffalo Electric Furnace Corp., Rand Building, Buffalo, will soon begin commercial production of new type of electric furnace and plans increased manufacturing schedule. Contract for part of units has been given to Erie City Iron Works, Erie, Pa.

◀ CLEVELAND ▶

Goodyear Tire & Rubber Co., Akron, Ohio, has purchased property at Syracuse, N. Y., as site for four-story factory branch, storage and distributing plant. Cost over \$300,000 with equipment.

Ohio Chemical & Mfg. Co., 1177 Marquette Street, Cleveland, plans extensions and improvements in steam power plant, including installation of equipment. Bids will be asked early in spring. Cost about \$30,000. Mayer & Valentine, Plymouth Building, architects.

Safety Auto Starter Co., Toledo, Ohio, has been organized by Samuel Gerson and Harry Levison, 951 Spitzer Building, to manufacture automobile starting equipment and devices.

Ohio Edison Co., Akron, Ohio, has applied for permission to acquire properties of Central Utilities Co., Marion, Ohio, in Muskingum, Trumbull and Portage counties, for \$472,575. Purchasing company plans expansion in district noted, including transmission lines.

Frederick Wells, Toledo, Ohio, heretofore connected with Mills, Rhines, Bellman & Nordhoff, Ohio Building, consulting engineers, is at head of project to operate local plant for manufacture of welded steel roof trusses, using standard structural steel sections. Company will be organized to carry out work and production will soon begin. Mr. Wells formerly was associated with Toledo Bridge & Crane Co.

◀ CINCINNATI ▶

Quartermaster Department, United States Army, Washington, has plans for airport buildings at Patterson Field, near Dayton, Ohio, including air corps hangar with annex for repair and reconditioning shop, oil storage and reclamation buildings and other field units.

Lancaster Coal & Sand Co., Wilber, Perry County, Ohio, producer of molding sand, etc., plans rebuilding part of plant recently destroyed by fire. Loss over \$75,000 with equipment.

Crosley Radio Corp., 1319 Arlington Street, Cincinnati, manufacturer of radio equipment and sets, has perfected new electric refriger-

ator and will develop for new line of production.

Contracting Officer, Wright Field, Dayton, Ohio, asks bids until Jan. 26 for two 20-in. lathes (Circular 264); until Jan. 27 for 300 generator assemblies (Circular 262), airplane parts, including pedal lock plungers, pedal lock sets, column wheel locks, column locks, etc. (Circular 259).

Bailey Body & Repair Co., Memphis, Tenn., has been organized by Malcolm Bailey, 1534 Ely Street, and associates to operate automobile body building and repair works.

Memphis Natural Gas Co., Memphis, Tenn., is arranging bond issue of \$750,000, part of proceeds to be used for expansion and betterments, pipe lines, etc. Company furnishes natural gas from Louisiana fields to Memphis and other points.

Tristate Tinning & Galvanizing Co., Cincinnati, care of H. H. Sunderman, 601 First National Bank Building, has been organized by Edwin Barry and George S. Hawke to operate metal galvanizing and tinning plant and to manufacture metal specialties.

City Council, Jellico, Tenn., will hold proposed municipal electric light and power plant in abeyance. Citizens defeated bond issue of \$150,000 for project at special election.

◀ INDIANA ▶

Allis-Chalmers Mfg. Co., Milwaukee, has acquired plant and business of Birdsell Clover Hulling Mfg. Co., South Bend, manufacturer of farm implements and equipment. Operations will be continued at present location for about 60 days, when equipment will be removed to Advance-Rumely Division plant at LaPorte and production concentrated there.

Standard Sanitary Mfg. Co., Kokomo, manufacturer of sanitary ware, a division of American Radiator & Standard Sanitary Corp., 40 West Fortieth Street, New York, has resumed operations following shut down for six weeks. Employment will be given to 300 men.

Hurwich Iron Co., South Bend, has been organized by Maurice L. and Samuel R. Hurwich, South Bend, to manufacture castings, forgings and other iron products, and to operate metal-plating works.

State Highway Department, Indianapolis, plans equipment storage and distributing plants in different parts of State, with automobile service and garage facilities. Work is under way on a machinery storage and distributing building at branch shop on Tibbs Avenue, Indianapolis.

Northern Indiana Public Service Co., Hammond, is arranging for purchase of plant and properties of Hobart Light & Water Co., Hobart, and will consolidate. Expansion is planned in Hobart district, including transmission lines.

Delco-Remy Corp., Anderson, manufacturer of automobile starting and lighting equipment, and Guide Lamp Corp., same place, manufacturers of automobile lamps, headlights, etc., affiliated organizations, are giving employment to over 6000 persons.

H. E. York and associates, Marion, Ind., have purchased properties and assets of Indiana Truck Corp. from Brockway Motors Corp., Cortland, N. Y. Company also will manufacture trucks powered with Cummins-Diesel oil-burning engine, made at Columbus, Ind., by Cummins Engine Co.

◀ CHICAGO ▶

Signal Corps, Procurement District, 1819 West Pershing Road, Chicago, asks bids until Jan. 26 for quantity of machine bolts, glass shell fuses, protector blocks, etc. (Circular 34); for soldering irons (Circular 35).

City Council, Peoria Heights, Ill., plans installation of electric-operated pumping machinery, elevated steel tank and other equipment in connection with extensions and improvements in municipal waterworks. Cost about \$100,000. W. A. Fuller Co., 2916 Shenandoah Avenue, St. Louis, engineer.

Northern States Power Co., 15 South Fifth Street, Minneapolis, Minn., plans installation of waterwheel and auxiliary power equipment at generating plant at St. Cloud, Minn.; also extensions and improvements in artificial gas plant at same place. Cost over \$100,000. Work will begin in spring.

National Battery Co., Roblyn Avenue, St. Paul, Minn., manufacturer of electric storage batteries, plates, etc., is considering branch plant at Winnipeg, Man. Cost over \$100,000 with equipment. G. P. Castner, vice-president and general manager.

Lincoln Mfg. Co., 201 North Wells Street, Chicago, has been organized with capital of \$1,000,000 to take over and expand company of same name at 3430 South Ashland Avenue, manufacturer of screws, machine products, etc. New company is headed by Marshall P. Fox and O. G. King.

People's Gas & Electric Co., Second Avenue, N. W., Mason City, Iowa, plans extensions and improvements in power plant and system to cost about \$500,000 including transmission lines and improvements in gas system.

City Council, Grand Junction, Iowa, plans municipal electric light and power plant. Cost \$85,000 with equipment. J. H. Watts is city clerk.

Department of Public Works, City Hall, Minneapolis, Minn., received low bid from C. H. Peterson & Co., Builders' Exchange Building, for one-story and basement, 66 x 116 ft., equipment storage and repair shop, and meter building. Cost about \$50,000 with equipment. A. M. Larson, City Engineer Office, is architect.

Rath Packing Co., Sycamore and Elm Streets, Waterloo, Iowa, meat packer, will soon take bids for one-story and basement addition, 70 x 179 ft. Cost over \$60,000 with equipment. John S. Bartley, company architect.

Walworth Co. is concentrating manufacture of brass valves and fittings, formerly handled from Boston factory, in Kewanee, Ill., and Greenburg, Pa., plants, according to announcement by A. J. Mather, vice-president and manager of Kewanee unit. Equipment and machinery are being transferred.

◀ MILWAUKEE ▶

Allis-Chalmers Mfg. Co., Milwaukee, has purchased complete line of road grading machinery manufactured by Ryan Mfg. Co., Chicago, and is consolidating this production at Advance-Rumely works at LaPorte, Ind. Purchase gives Allis-Chalmers company full line of tractor and road machinery equipment.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has increased production schedules close to capacity as result of orders for horizontal boring, milling and drilling machines.

Wesbar Corp., West Bend, Wis., has doubled working force and instituted night shift to execute contract for 1,000,000 flashlight lanterns amounting to about \$300,000. Production schedule calls for daily output of 3000 units for nine months.

Berwind Fuel Co., Duluth, Minn., has started work on new screening plant, costing about \$30,000, at its briquet plant on St. Louis Bay.

◀ GULF STATES ▶

Texas Potash Co., Dallas, Tex., plans installation of potash mining plant and refinery at properties at Odessa, Tex., including power house, machine shop, pumping plant and other units. Cost over \$1,500,000 with equipment.

City Council, Morgan City, La., will soon ask bids for equipment for municipal electric light and power plant and waterworks, including two 400-kw. oil-operated engine-generator units with accessories, switchboard and other equipment; two electric-operated pumps, each with capacity of 1000 gal. a min., one electric-operated pump, capacity 3000 gal. a min., one 12,000-gal. oil storage tank, electric transmission equipment, etc. Swanson-McGraw, Inc., Balter Building, New Orleans, is engineer.

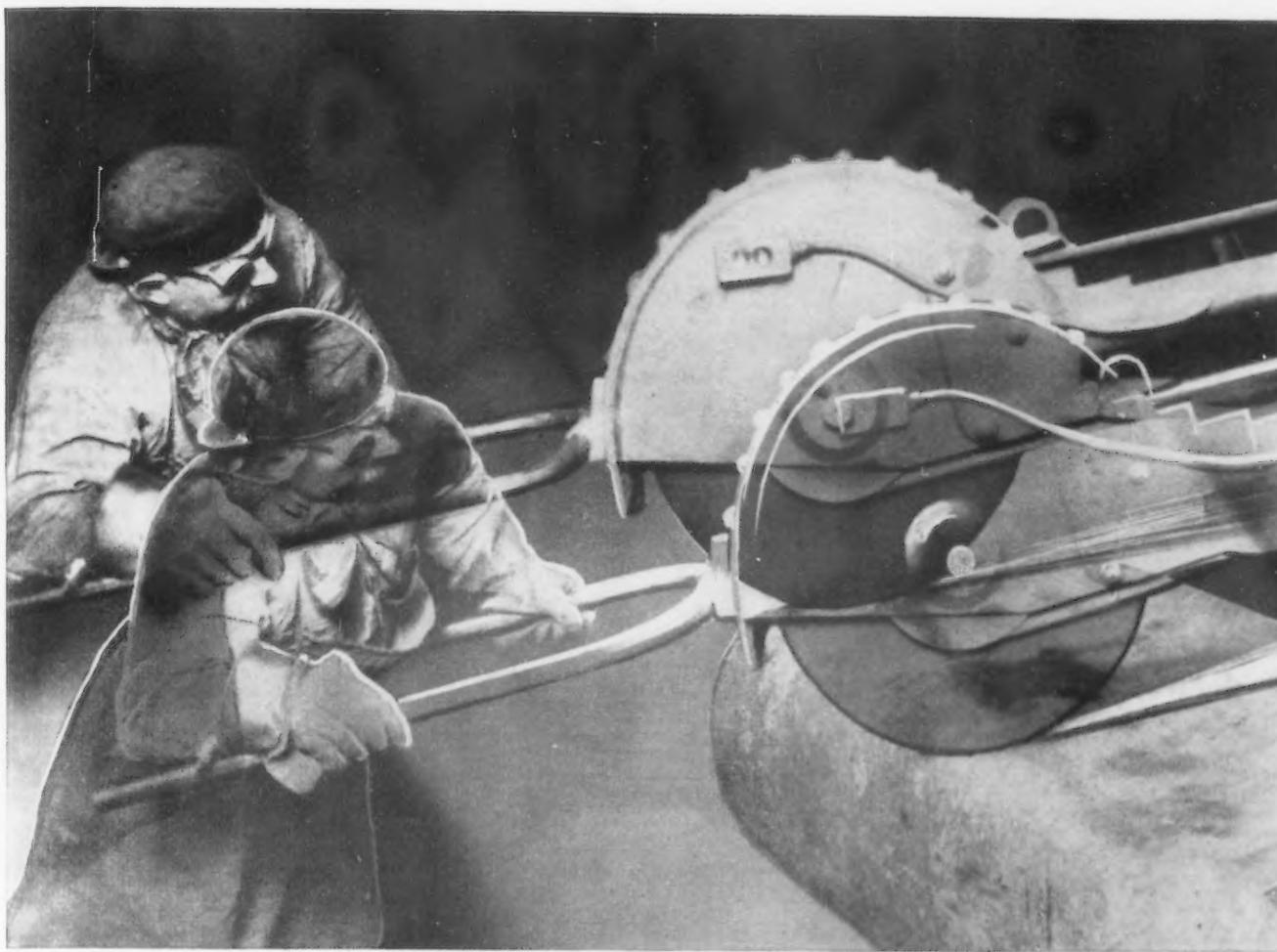
Wedell-Williams Air Service Corp., New Orleans, has been organized to take over and expand company of same name with headquarters in Whitney Building, increasing capital from \$50,000 to \$175,000. Harry Williams is president.

Phoenix Refining Co., San Antonio, Tex., has acquired oil refinery of Texas Eagle Refining Co., West Dallas, Tex., from receiver. Purchasing company will remodel plant, which has capacity for handling 750 bbl. of crude oil daily.

United States Engineer Office, First District, New Orleans, asks bids until Feb. 10 for one steel non-propelled spray boat (Circular 14).

Board of Education, San Antonio, Tex., plans manual training shops in two-story North Side junior high school and will ask bids soon on general contract. Cost over \$350,000. Atlee B. and Robert M. Ayres, Smith-Young Tower, architects; L. D. Royer, same address, mechanical engineer.

Uvalde Rock Asphalt Co., San Antonio, Tex., plans development of clay-mining prop-



Doing double duty with high speed grinding wheels

Put two men on a snagging job and it will be done more quickly—but it will cost more. Put a high speed wheel to work—and it will cost less. In some instances speeds have been increased a third, in others they have been doubled by the use of snagging wheels bonded with phenol resinoids. These wheels are capable of speeds of 9,000 S.F.P.M., running easily and freely, cutting cleanly and without gumming. The phenol resinoid bond is extremely tenacious holding the grit firmly against the work until it is worn and

BAKELITE CORPORATION, 247 Park Avenue, New York.

BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

dull, when the worn abrasive is released exposing the new sharp particles underneath.

The economies of high speed grinding are being made available in new and additional types of grinding machines. Consult the leading makers of cut-off machines, sling frames, and the various automatic or semi-automatic grinders. Or call upon the manufacturers of abrasive wheels bonded with phenol resinoids made by the Bakelite Corporation. Write us for a list of their names and addresses.

CHICAGO OFFICE, 635 West Twenty-Second Street

BAKELITE

MADE IN U.S.A. BAKELITE is a registered trademark of the Bakelite Corporation. The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the symbol of infinity, a registered sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

THE MATERIAL OF A THOUSAND USES

erties near Leakey, Tex., with installation of mining, hoisting, conveying, loading and other equipment. Cost over \$50,000.

Tangipahoa Products Corp., Hammond, La., contemplates fruit canning plant. Cost over \$30,000 with automatic canning and other machinery. Allen H. Daughdrell, one of heads of company, is in charge.

Strake Oil Corp., 1924 Oakdale Street, Houston, Tex., is considering erection of oil refinery with storage and distributing unit. Cost close to \$80,000.

Octane Oil Refining Co., Baird, Tex., has work under way on new refinery to have daily capacity of 1500 bbl. Cost over \$90,000 with machinery. Project will include a storage and distributing unit.

Board of Commissioners, Orleans Levee District, New Orleans, will soon take bids for buildings for Shushan Airport, Lake Pontchartrain, including two hangars, each 125 x 225 ft.; repair and reconditioning shop, 100 x 120 ft.; two-story administration building, 70 x 300 ft.; equipment storage and distributing building, oil station and other airfield units. Cost over \$400,000 with equipment. National Airport Engineering Co., Ltd., 755 East Washington Street, Los Angeles, engineer, John Klorer, chief engineer for board.

Lion Tool & Supply Co., Longview, Tex., has been organized by Harry O. and Douglas C. Lown, Longview, to operate machine shop and foundry for production of oil well tools and kindred equipment.

◀ PACIFIC COAST ▶

Payne Furnace & Supply Co., 338 North Foothill Road, Los Angeles, manufacturer of furnaces and heating equipment, has plans for one-story addition. Cost about \$25,000 with equipment.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is arranging fund of \$31,000,000 for expansion and improvements in power plants and system, including addition to hydroelectric generating plant on Mokelumne River, new steam-operated electric power plant in San Joaquin Valley, new steel tower transmission lines, power substations and other construction.

Upland Lemon Growers' Association, Upland, Cal., has asked bids on general contract for three-story packing and storage plant, 140 x 200 ft. Cost about \$100,000 with conveying and other equipment. W. W. Ache, 1616 West Fourth Street, Los Angeles, architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 2 for seven hand-operated traveling cranes and two 1-ton capacity I-beam trolleys (Schedule 7247), one motor-driven turret lathe (Schedule 7278), two electric-driven fire pumps and one electric-driven flushing pump (Schedule 7268) all for Mare Island Navy Yard; one motor-driven grinding machine, spindles and attachments (Schedule 7240), one saw table, electric-operated and one motor-driven mortising machine (Schedule 7239) for San Diego Navy Yard; four motor-driven air-cooled circulating pumps and spare parts (Schedule 7202) for Puget Sound Navy Yard, and for 85 helium storage tanks for Mountain View, Cal. (Schedule 7241).

Oregon Electric Railway Co., Portland, plans rebuilding part of repair shops recently destroyed by fire. Loss over \$75,000 with equipment.

Santa Barbara Junior High School District, Santa Barbara, Cal., will soon take bids for 600 steel lockers and other equipment for high school. W. H. Weeks, 525 Market Street, San Francisco, architect.

Constructing Quartermaster, 829 Fourth Street, San Rafael, Cal., has plans for bombing base in Marin County, including 11 hangars, 100 x 200 ft., machine and assembling shops, two equipment storage and distributing buildings, each 100 x 200 ft., parachute building, radio station, and other units. Cost \$5,000,000 with equipment.

Board of Education, Kirkland, Wash., has authorized installation of manual training department in two-story and basement junior high school, on which bids will be asked soon on general contract. Cost \$100,000. William Mallis, Lyon Building, Seattle, architect.

Imperial Irrigation District, El Centro, Cal., has called special election Feb. 11, to approve construction of new irrigation system in Imperial and Coachella Valleys, with electric-operated pumping plants, transmission lines and other work. Cost \$33,500,000.

Southern Pacific Railroad, San Francisco, has resumed operations at repair shops at

Ogden, Utah, following curtailment for several weeks, and will give employment to more than 300 men on a four-day week basis.

◀ CANADA ▶

Hamilton Clamp & Stamping Works, 62 Ashley Street, Hamilton, Ont., is asking bids for a one-story addition for which equipment will be purchased.

W. T. Thompson Co., Port Credit, Ont., whose mill section of lumber plant was destroyed by fire, will rebuild and will require equipment.

Kellogg Mfg. Co., Ltd., Rochester, N. Y., has leased premises at 579-585 Richmond Street West, Toronto, for manufacture of air compressors, paint spraying equipment and other air-operated devices and accessories.

Windsor Elevator & Warehouse Co., Ltd., Windsor, Ont., has awarded contract to Fegles Construction Co., Ltd., Fort William, Ont., for erection of a 2,000,000-bu. grain elevator. Project will cost about \$1,257,000.

Walter Motor Trucks of Canada, Ltd., subsidiary of Walter Motor Truck Co., Long Island City, N. Y., has acquired premises at Eighteenth and Town's Streets, New Toronto, Ont., for manufacturing purposes.

John C. Virden Co., Cleveland, Ohio, has taken factory space in Beardmore Building, 37 Front Street East, Toronto, for manufacture of electric light fixtures, etc. J. M. Ehrlich will be in charge.



THE accompanying reproduction of a photograph shows a part of the manganese deposits of the Artillery Peak district of Arizona. The thickness of the bed at this point is 27 ft. and this particular outcrop is about 5700 ft. long, averaging 20 ft. in thickness. Dwight E. Woodbridge, consulting engineer, Duluth, Minn., who is one of those having an interest in the deposits, says that the ore falls into three general classes in this particular district. One averages say 12 per cent in manganese from four tons of which ore one ton of 45 per cent concentrate can be made. A second class averages 25 per cent manganese, of which 2½ tons yield one ton of 50 per cent manganese. The third class assays 45 to 47 per cent manganese as mined.

◀ FOREIGN ▶

Department Quartermaster, Panama Canal Department, Quarry Heights, Canal Zone, asks bids until Feb. 6 for two double air corps hangars, one air corps machine shop, and one air corps warehouse at Albrook Field, Canal Zone (Circular 3).

Department of Transportation, Soviet Russian Government, Moscow, A. A. Andreyev, commissioner, plans electrification of 3215 km. (about 2000 miles) of railroad lines in next 24 months, including roads in mining districts of Donets Basin, Kuznetsk Basin and Urals. Work will be part of electrification plans approved in 1931, with appropriation of 31,300,000 rubles (about \$15,650,000). It is proposed to build 30 electric locomotives for service on roads in 1932. Construction is under way on steam locomotive plant at Luhansk, to have capacity of over 1050 engines annually, including parts and assembling. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Secretary, Chilean State Railways, Santiago, Chile, asks bids until Feb. 18 for equipment for several repair shops, including forge and blacksmithing tools, spring testing machine, machine tools, electric-operated overhead traveling crane, motor tractors, etc.

Department Quartermaster, Fort Shafter, Hawaii, asks bids until Feb. 15 for gasoline fueling system at Wheeler Field, T. H.

Construction Division, Royal Air Force, Singapore, Straits Settlements, will soon begin erection of new aerodrome near city, to include hangars, machine shops, oil storage buildings and other field units. It is estimated to require four years for completion. Cost \$3,500,000 with equipment. Temporary aerodrome is being established at Seletar, Singapore Island.

Trade News

Stedfast & Roulston, Inc., 156 Oliver Street, Boston, machinery dealer, has by mutual agreement cancelled its sales contract for Flather lathes in New England and will confine sales to equipment manufactured by R. K. LeBlond Machine Tool Co., Cincinnati.

H. C. Kensing, Inc., 342 Madison Avenue, New York, has been organized as a distributor of iron, steel, metals and tubular products. H. C. Kensing, president, will continue to represent Detroit Seamless Steel Tube Co., Detroit, and Lehigh Babbitt Co., Allentown, Pa.

Northern Equipment Co., Erie, Pa., controllers, valves, etc., has appointed Hopton Co., 404 Denison Building, Syracuse, N. Y., as its Syracuse representative.

Clark Controller Co., 1146 East 152nd Street, Cleveland, has taken over the management of Una Welding, Inc., Cleveland. E. A. Hurme, formerly Pittsburgh district manager for Clark company, has been appointed assistant sales manager in charge of Una sales.

J. F. Corlett & Co., Cleveland, steel sales agents, have moved their offices to 1201 Citizens Building, that city, from the Union Trust Building.

Tubular Products Mfg. Co., Southington, Conn., has appointed the following officers: Alfred M. Smith, president; Charles B. Simmons, vice-president; Clifton I. Stone, secretary-treasurer, and Orville H. Bailey, factory manager. All of the officers are on the board of directors which also includes Leo Davis.

Kalman Steel Co. has moved its Washington office from the Barr Building to a suite in the Wilkins building, adjoining offices of the Bethlehem Steel Corp., of which the former is a subsidiary.

New Trade Publications

Business Engineering,—Keays-Weaver, Inc., Buffalo, N. Y. Booklet entitled, "When Dollars Fly Out the Window," outlines the scope of the service offered by this organization in the solution of problems of production, management, sales and distribution.

Steel Flooring,—Belmont Iron Works, Philadelphia. Eight-page reprint of an article on "A New Type of Steel Floor," by J. G. Shryock, chief engineer of the company. The article gives comparative tests of riveted, bolted and welded floor panels, each of which was made of seven channels assembled to form the Belmont rolled structural steel interlocking type of floor.

Canal
e, asks
r corps
p, and
Field,

et Russ-
dreyev,
f 3215
ines in
mining
ain and
ification
tion of
It is
ves for
tion is
at Lut-
engines
mbling.
Avenue,

antiago,
ipment
age and
machine,
d trav-

shafter,
gasoline

Force,
on be-
r city,
storage
s esti-
pletion.
emporary
Seletar,

Street,
mutual
ct for
ll con-
ed by
nnati.

avenue,
ributer
oducts.
ue to
e Co.,
ntown,

, con-
Hopton
Y., as

152nd
man-
veland.
district
en ap-
urge of

l sales
itizens
Trust

ington,
fficers:
. Sim-
secret-
factory
board
avis.

ington
uite in
of the
mer is

ons

, Inc.,
Dollars
ope of
in the
anage-

Phila-
cle on
J. G.
. The
iveted.
which
o form
erlock-